DOCUMENT RESUME

ED 160 327 **RC 010 860**

TITLE	National Conference on Nonmetropolitan Community Services Research. Committee Print (95th Congress, 1st Session) Prepared for the Committee on Agriculture, Nutrition, and Forestry, United States Senate.
SPONS AGENCY	Economic Research Service (DOA), Washington, D.C. Economic Development Div.; Farm Foundation, Chicago, Ill.; North Central Regional Center for Rural Development, Ames, Iowa.; Northeast Regional Center for Rural Development, Ithaca, N.Y.
PUB DATE	12 Jul 77
NOTE	349p.; Not available in hard copy due to small print size of original document; Papers presented at the National Conference on Nonmetropolitan Community Services Research (Ohio State University, January 11-13, 1977)
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Community Action; Community Role; Community Service Programs; *Community Services; *Community Study; Conference Reports; Decision Making; *Delivery Systems; Financial Needs; *Financial Policy; Fund Raising; *Government Role; Needs Assessment; *Research; Rural Areas; Rural Development; Taxes
IDENTIFIERS	*Nonmetropolitan Areas

ABSTRACT

One of the more troublesome aspects of providing an adequate quality of life in rural America, involving the public sector and community services delivery, has grown in recent years as the pace of socioeconomic change in rural areas has accelerated. In order to facilitate the improvement of the quality of nonmetropolitan community services research for public decision making at all levels, the conference was structured around the problems of resources, organization, and service delivery, and featured eight major papers and 19 special papers. The Resources portion of the conference included sections on financing community service in nonmetropolitan areas and on the meaning of intergovernmental revenue and current tax theory and policy to smaller units of government. The two sections of the Organization portion dealt with public choice in theory and research and with coordination of community service delivery in nonmetropolitan areas. The three sections constituting the Delivery sessions were: needs and use assessment at national and local levels; conceptual bases and measurement of quantity, quality, and consumer satisfaction; and service cost-quality-quantity relationships. The introductory paper was "On the Taxonomy of Nonmetropolitan Community Services Research". Other major papers included "Fiscal Needs and Resources of Nonmetropolitan Communities", and "Public Choice Theory: Research Issues for Nonmetropolitan Areas". (DS)

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rec 7-10-77

ED160327

95th Congress }
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COMMITTEE PRINT

NATIONAL CONFERENCE ON NONMETROPOLITAN COMMUNITY SERVICES RESEARCH

PAPERS PRESENTED AT THE NATIONAL CONFERENCE ON NONMETROPOLITAN COMMUNITY SERVICES RESEARCH SPONSORED BY THE ECONOMIC DEVELOPMENT DIVISION, ECONOMIC RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE; FARM FOUNDATION; NORTH CENTRAL REGIONAL CENTER FOR RURAL DEVELOPMENT, AND NORTHEAST REGIONAL CENTER FOR RURAL DEVELOPMENT—HELD AT OHIO STATE UNIVRESITY, JANUARY 11-13, 1977

PREPARED FOR THE

COMMITTEE ON AGRICULTURE, NUTRITION, AND FORESTRY UNITED STATES SENATE

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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JULY 12, 1977

Printed for the use of the
Committee on Agriculture, Nutrition, and Forestry

U.S. GOVERNMENT PRINTING OFFICE
88-864 WASHINGTON : 1977

RC 010860

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FOREWORD

The National Conference on Nonmetropolitan Community Services Research was held in mid-January of this year. Two events make this Conference especially significant at this time: the enactment of the Rural Development Act of 1972 which is an important statement of policy with respect to the distribution of people and industry across the face of the Nation; the recent turnaround in rural-urban migration flows which apparently makes obsolete much of the past thought and knowledge about the flow of people from rural areas to the large urban centers. These two events will complement and supplement one another and increase the probability that much of Rural America can be truly revitalized. This revitalization will not be painless. Rural communities with inadequate community services for their current populations will be faced with the even greater responsibilities of providing adequate services for larger populations. In all likelihood there will remain a number of rural communities that will not grow and develop. These communities will also face the problems of providing adequate community services for their population but without the advantages of a growing tax base.

In 1977, and subsequent years, the Congress will have significant opportunities to influence the development of Rural America as well as the research which in turn can assist in the shaping of that development. In the interest of providing the members of the Senate Committee on Agriculture, Nutrition, and Forestry, the Senate, researchers, and the general public with timely and reputable information regarding the status of community services research, I have asked that the papers presented at the National Conference on Nonmetropolitan Community Services Research be published as a committee print. While the views and analyses presented in these papers are those of the authors and not of the Committee or of the USDA, the Committee nonetheless wishes to recognize that these Conference speakers are professionals and experts in their respective fields.

HERMAN E. TALMADGE, *Chairman.*

PREFACE

It is the mission of the U.S. Department of Agriculture and the Land-Grant University system to develop and disseminate socioeconomic information relating to rural America and agriculture. As our society has become more complex, the conduct of that mission has become increasingly difficult and challenging. The task demands foresight, creativity, and increasing research skill and productivity.

One of the more troublesome aspects of providing an adequate quality of life in rural America has long involved the public sector and community services delivery. The problems herein have grown in recent years as the pace of socioeconomic change in rural areas has accelerated. Quality research is needed to attack these problems and the papers contained in this volume represent an attempt to address these rural issues.

The papers were delivered at the National Conference on Nonmetropolitan Community Services Research held at Ohio State University on January 11–13, 1977. The purpose of the Conference was to facilitate the improvement of the quality of nonmetropolitan community services research for public decisionmaking at local, State, and Federal levels. This includes identification of emerging problems, exploration of new research approaches, discussion of new theoretical developments, and presentation of the latest research findings.

The Conference sponsors were the Economic Development Division, Economic Research Service, U.S. Department of Agriculture; Farm Foundation; North Central Regional Center for Rural Development; and Northeast Regional Center for Rural Development. The Conference Planning Committee was comprised of Thomas F. Hady and Jerome M. Stam, Economic Research Service, U.S. Department of Agriculture; R. J. Hildreth and W. Neill Schaller, Farm Foundation; Ronald C. Powers, North Central Regional Center for Rural Development; and Lee M. Day, Northeast Regional Center for Rural Development.

The Conference was structured around problems of resources, organization, and service delivery. All service categories—physical, physical-people, and people—were potential topics of discussion. An attempt was made to view the service delivery problem from the local level with the Federal and State governments regarded as both servants and masters.

Eight major papers (2 on *resources*, 2 on *organization*, and 4 on *delivery*) and 19 special papers were presented. (Major papers address broader issues or subject matter fields than do special papers and are approximately twice the length of the latter.) Most papers were written and distributed to attendees in advance of the Conference. No formal reviews of the papers were given, but adequate time for broad audience discussion was allowed.

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Conference attendance was by invitation with participation limited to an overall total of approximately 100 persons. Attendees and speakers were drawn from both inside and outside the USDA-Land Grant complex. The objective was to limit total attendance so each day could be comprised of several plenary sessions with open discussion. This avoided the necessity of having subgroup sessions and such groups reporting back to the larger group. This volume is an attempt to communicate the core of the Conference to the interested research and policy community at large.

The Conference Planning Committee is indebted to a large number of people who assisted with various aspects of the planning and conduct of the Conference as well as in preparing this proceedings volume. However, special recognition is due the following persons: Judy B. Daniels, Sondra K. Rhoades, and Betty J. Smith, Fawcett Center for Tomorrow, Ohio State University; Fred J. Hitzhusen, Department of Agricultural Economics and Rural Sociology, Ohio State University; Dorothy J. Messenger, Administrative Aide, and John S. Reaves, Research Support Specialist, Northeast Regional Center for Rural Development; Gerald C. Grooms, Assistant Extension Editor, Ohio State University; Donald W. Dickson, Public Information Specialist, Economic Research Service, U.S. Department of Agriculture; and James W. Giltmier, Professional Staff Member, U.S. Senate Committee on Agriculture, Nutrition, and Forestry.

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PART I: INTRODUCTION

ON THE TAXONOMY OF NONMETROPOLITAN COMMUNITY SERVICES RESEARCH

[By Jerome M. Stam*]

Facts or principles are of little use unless properly related. It is thus not surprising that classifying things is one of the most fundamental and characteristic activities of the human mind and underlies all forms of science. The classification task typically is difficult and the need to rely on considerable classification in scientific work has led to the theoretical study of classification itself. This field, called taxonomy, can be defined as the study of the principles and practices of classification.

In this paper, I propose to address the problem of taxonomy and classification as it relates to only a very tiny portion of man's present stock of knowledge—that pertaining to community services research. I do so in the context of attempting to delineate the intended scope and thrust of the National Conference on Nonmetropolitan Community Services Research on behalf of the Conference Planning Committee.[1] In carrying out my charge, I shall draw on examples from the physical and biological as well as the social sciences.

IMPORTANCE

Research which instructs policy decisions should reflect a relevant set of problems and the evidence suggests that the nature of nonmetropolitan community service needs may be shifting somewhat because of recent population changes. Since World War II, public policy has been conducted with the belief that population in nonmetropolitan America was declining. The actual situation was more complex and we need to take a brief look at it.

Between 1940 and 1970 (based on 1973 metropolitan status), the nonmetropolitan population increased 6.6 percent (from 51.8 to 55.2 million) while the metropolitan population increased 84.1 percent (from 80.4 to 148.0 million) (33). But this modest rate of nonmetropolitan gain masks considerable internal variation. For example, consider the rural population for a moment. During the 1940–1970 span, there was an overall 30 percent rural population decline in the Great Plains, western Corn Belt, southern Appalachian coal areas, and old Cotton Belt of the Southern Coastal Plain. However, a 44.2 percent overall population growth occurred in the zones between

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*Leader, State and Local Government Program Area, Economic Research Service, U.S. Department of Agriculture, Washington, D.C. The author is indebted to the following for helpful comments on an earlier draft of this paper: Lee M. Day, Gerald A. Doeksen, R. J. Hildreth, Fred J. Hitzhusen, J. Norman Reid, and Thomas F. Stinson. However, the author is solely responsible for the contents.

[1] In addition to the author, the Conference Planning Committee was comprised of Lee M. Day, Northeast Regional Center for Rural Development; Thomas F. Hady, Economic Research Service, U.S. Department of Agriculture; R. J. Hildreth and W. Neill Schaller, Farm Foundation; and Ronald C. Powers, North Central Regional Center for Rural Development.

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metropolitan areas of the Lower Great Lakes and Northeast, in the Far West, the Florida Peninsula, and in the Southern Piedmont (5, pp. 23–24).

During the past decade, the comparative situation for nonmetropolitan areas has changed quite dramatically. Nationally, during the 1960's, these areas grew 4.4 percent compared with the 17 percent growth of the metropolitan population (1974 metropolitan status) (4). Between April, 1970 and July, 1974, however, nonmetropolitan areas grew 5.6 percent compared with 3.4 percent for metropolitan areas (4). Increased retention of population in nonmetropolitan regions is widespread throughout the United States during the 1970's (6, p. 7). Net migration rates for nonmetropolitan areas for the 1970–1974 period were positive and were much different in their spatial distribution from the negative patterns exhibited in the 1960's (4, 6).

I shall not go into details, which are available elsewhere, regarding the causes of this quite dramatic turnaround, but the implications are great for community services requirements in those areas showing the most growth (6). This includes a range of situations from retirement communities to senior State college towns to energy boom towns. Research is needed on the variety of community service problems these shifts imply. (The still declining areas continue to face a different set of service problems necessitating a somewhat different research emphasis.)

Research and policy involvement by the U.S. Department of Agriculture (USDA) and Land-Grant universities in the field of community services is not new. It showed perhaps uneven growth in earlier years, but became more institutionalized beginning in the 1950's as a part of the broader thrust termed rural development. Additional legislation was passed in the 1960's and the latest action resulted in the Rural Development Act of 1972 (P.L. 92–419). This further delineated the rural development effort by both amending earlier legislation, such as the Consolidated Farmers Home Administration Act of 1961, and added new research emphasis through its title V.

Through the years, a core of USDA-Land Grant researchers with an interest in community services has been developed and community services now account for a significant share of the funds going into rural development research. Today there is increasing competition for this research dollar within the USDA-Land Grant complex. This is caused by such factors as the research needs of commercial agriculture stemming from such developments as a burgeoning agricultural export market and the agricultural technical assistance needs in the less developed countries. Thus, it is imperative that every effort be made to facilitate communication and improve focus in order to better establish research priorities on nonmetropolitan community services. To assist this end, the idea of a conference was conceived. The Conference was designed to draw on expertise from both within and outside the USDA-Land Grant System. Three major disciplines—economics, political science, and sociology—are involved.

The specific stated purpose of the Conference is to facilitate the improvement of the quality of nonmetropolitan community services research for public decisionmaking at local, State, and Federal levels. This includes identification of emerging problems, exploration of new research approaches, discussion of new theoretical developments, and presentation of the latest research findings. In order to carry out this purpose, a general classification scheme is necessary. I shall attempt to address some of the taxonomic problems faced by the three major social sciences (economics, political science, and sociology) involved in the Conference, but must admit that my background and training as an economist give rise to a certain outlook (and biases) as true of any field of inquiry.

SOME LESSONS FROM THE PHYSICAL AND BIOLOGICAL SCIENCES

I have selected three examples of taxonomic problems faced by the physical and biological sciences that are of interest for our purposes. They deal with the physical universe, in a micro and macro sense, and with the system of binomial nomenclature. Each has a number of lessons for those of us concerned with taxonomic problems within the social sciences and I, therefore, shall go into some detail on each.

Micro: The Periodic Table

One of the earliest and most successful attempts at taxonomy is shown by the effort of chemists to identify and classify the elements. Failure to develop a taxonomy in this field of inquiry certainly would have indicated severe problems in the less physical fields. Historically, the discovery of new elements was a slow process. Nine were known to the ancients, four were studied by medieval alchemists, and thirteen were finally discovered in the eighteenth century (2). But in the first decade alone of the nineteenth century, fourteen new elements were discovered. Efforts toward classification began, and in 1829, Dobereiner arranged many of the common elements into "triads." This work was superceded by Newland's law of octaves (1866), which was derived from the findings that every eighth element in a series is similar in chemical and physical properties.

By 1869, there were 62 known elements when two chemists, Meyer and Mendeleev, working independently, proposed similar classification schemes for the elements (19). The German Meyer independently proposed a similar table, but the Russian Mendeleev is mainly credited with the concept. Mendeleev's table was based upon a classification of elements as a function of their atomic weights. Finally, Moseley's work (1912–1914) on atomic numbers gave us the new periodic law which states that the properties of elements are periodic functions of their atomic numbers. This resulted in some modification of Mendeleev's table and represents the basic approach used today.

Chemists have found the periodic law and table valuable as: (1) an aid to memory (pedagogic value), (2) in predicting "new" elements, and (3) in checking experimental work, such as density and melting points. This is of consequence to us because relevant taxonomic systems within the social sciences can produce similar utility. It is also worth noticing that it took chemists 40 years (from Dobereiner 1829 to Mendeleev 1869) or 85 years (from Dobereiner to Moseley 1912–1914), depending on how one views it, to solve what turns out to be a fairly basic problem in dealing with the physical universe. Also, it is significant when one learns that there are several versions of the periodic table currently in use. As an economist, I must thus conclude that it is not surprising we economists are still having some taxonomic quarrels over 200 years after Adam Smith's *The Wealth of Nations*. I shall allow the other social sciences to speak for themselves.

Macro: The Solar System

Let's now turn to the larger problems of the physical universe. The history of man's attempt to gain perspective on his own situation through the classification and identification of the various objects detected in the sky is interesting (1, 7, 17).

Hipparchus, who did his major work from 146 to 127 B.C., was the greatest astronomical observer of antiquity. He rejected the heliocentric concept of the universe suggested by Aristarchus (c. 270 B.C.) and developed the geocentric hypothesis. Ptolemy synthesized and expanded upon the geocentric thinking of the Greek astronomers during the period A.D. 127–145. The Ptolemaic system was an elaborate model of the heavens composed of large circles, called deferents, and small circles called epicycles. Such a system allowed for the puzzling retrogressive motion, and changes in brightness and velocity observed in certain heavenly bodies. It also led to other conclusions such as the idea that falling bodies fall toward the center of the universe, i.e. the earth.

By the sixteenth century, the Ptolemaic interpretation had become firmly entrenched in astronomical thinking. However, as observations became more exact, it became evident that the geocentric hypothesis was too complex and inaccurate to be acceptable. In 1543, Copernicus published his *On the Revolution of Celestial Spheres*, which established the sun as the center of the solar system. The resistance of the establishment to this new thinking is well-documented. Ultimately, it had great implications for the rise of modern science. Copernicus had made the earth subject to mathematical calculation, changes the concept of the size of the universe, altered thinking on why bodies fall to the ground (which ultimately led to Newton's concept of universal gravitation), and thus required a complete change in man's philosophical concept of the universe.

There is a sizable lesson in this for those of us considering taxonomical systems today. Among the lessons we should keep in mind is that we must not allow any taxonomical system to become sacrosanct and an end in itself. Instead, we must keep such conceptual thinking under scrutiny and thus make changes as new evidence is brought to bear. There is a tendency for people to assume that they understand something if they can somehow classify it by forcing it into a mold. The "fit" often is not what we imagined. Thus, it is typically somewhat painful when we are forced to change our conceptual framework with the attendant uncertainty that often results. Yet, we must not avoid new evidence if progress is to be made.

Binomial Nomenclature

Most are familiar with the system of binomial nomenclature used by biologists to classify plants and animals. Carolus Linnaeus (1707–1778) established taxonomic biology as a discipline. Before Linnaeus biologists designated plants and animals by cumbersome phrase names called polynomials (18, p. 162). He developed a system where each kind of plant or animal is designated by two words, the genus name and the specific name. The use of Latin avoided the influence of local names and by working from the specific to the general (from species to kingdom) some earlier classification problems were avoided. His

Species Plantarium (1753) and fifth edition of *Genera Plantarium* (1754) still are the starting points for modern names of plants (18, p. 163). No names published earlier, or not published in accordance with the binomial system, are in use today. Today at the undergraduate level this system often is presented to students almost as an article of faith. But there are many problems with it and I shall mention a few.

The stability of the classification system is crucial at the binomial level, yet in the early nineteenth century biologists indulged in casual namechanging. Confusion resulted and a priority rule was adopted in 1842 that restricts name changing except under well-defined conditions. Moreover, there are no strict guidelines as to what constitutes a genus or species and as one text states "taxonomy is one of the few sciences where the work of the incompetent is not ignored; instead it is avidly searched out and preserved" (38, p. 560).

The subjectivity of many taxonomic judgments has led to the modern search for more objective systems. This has induced the development of numerical taxonomy which assumes all characteristics of living organisms are equally meaningful—instead of certain characteristics such as flowering parts. In a nutshell, the modern debate in biology over taxonomy is well-illustrated in the following quotation:

> In biological classification, the communicative function is seriously at odds with the organizational one. On the one hand, unique and stable designations of species are required for description of the living world. But on the other hand, a classification system attempts to express relations among living things. As our ideas change about these relations, so must our classification. This function requires fluidity; the descriptive function requires stability. Biological classification thus treads a line of uneasy compromise between the two functions. In the long run it will probably be necessary to abandon the use of the same classification system for both purposes. Binomial nomenclature will no longer be used, or it will not be used to reflect the position of an organism in the living world. This suggestion is so radical that it meets with great opposition (38, p. 562).

The lesson for those of us interested in social science taxonomic systems should be clear. It is apparent that we will need a variety of classification systems depending on the problem at hand and purpose intended.

SOME LESSONS FROM THE SOCIAL SCIENCES

Those of us working in the various social sciences sometimes admire from a distance the ease of observation and apparent order inherent in the physical and biological sciences. But as we have just seen, the order that exists may sometimes be more apparent than real. Moreover, the classification systems that have been developed have required considerable intellectual investment and are not without their problems and conflicts.

Turning to the social sciences we typically feel less at ease. Laboratory observations typically are not as easy or simply are not possible. We have our conflicting schools and ideologies, yet a core of classified knowledge has arisen. Perhaps we should call it conventional wisdom.

Galbraith has written "the right to enunciate the conventional wisdom . . . is one of the rewards of high academic rank, although such rank is also a reward for expounding the conventional wisdom at a properly sophisticated level" (22, p. 12). Thus, I feel it is of interest to look briefly at the classification systems and problems thereof outlined for the three major disciplines represented at the Conference by checking the appropriate articles in the *Encyclopedia Britannica* (Macropoedia: Knowledge in Depth series). Leaders in the respective professions typically are requested to write such articles and the type of audience addressed should dictate some sort of consensus approach. Thus, these articles should highlight some of the classification problems inherent in each of these disciplines.

Economics

The very first sentence in the *Britannica* article entitled "economics" reads "No one has ever succeeded in neatly defining the scope of economics" (21, V. 6). This is not surprising to economists who have read and disagreed in varying degrees with the scope of the definitions given by leading economists, such as Marshall, Robbins, and Samuelson, over the years. Thus, the main taxonomic problem facing the field of economics is the boundary question of the discipline itself. Viner's comment that "Economics is what economists do" thus lives on (9, p. 3).

The remainder of the *Britannica* article offers little insight on taxonomic questions. The development of economic thought is traced, economics as a science is defended, then the field is broken into micro and macro. Cutting across these major divisions are public finance, money, international economics, labor, industrial organization, agriculture, growth and development, mathematical economics, and econometrics. This division is neither controversial nor very enlightening to an economist—but it is more complete than the classification offered for the other two disciplines in question.

Political Science

According to *Britannica*, "Political science is most generally understood to mean the systematic study of governmental processes by the application of scientific methods of analysis" (21, V. 14). As with economics, a boundary problem exists, especially along the interface with political philosophy. Also, the argument about whether the field is a science exists. Supposedly Thorstein Veblen denied that political science was anything more than a "taxonomy of credenda" (21, V. 14).

As a field political science can be traced back to Aristotle, although as a modern field of inquiry it is younger than economics. It was influenced significantly in its development by sociology and law in the nineteenth and early twentieth centuries. A separate school of political science was established at Columbia University in 1880. In Britain, the London School of Economics and Political Science was established in 1895 and a separate chair was established at Oxford in 1912.

The classification of contemporary political science outlined in *Britannica* is very basic consisting only of the fields of behavioralism; systems analysis; interest groups, elites, and political parties; and the analysis of political attitudes and voting behavior. However, the article author notes that "The failure of the discipline to settle the question of identity has made for a creative and inventive exploration of many avenues of research, but the achievement of a unified general theory of political behavior on which there is common consent still lies ahead" (21, V. 14).

Sociology

The *Britannica* definition is complex:

> Sociology is a branch of the science of human behaviour that seeks to discover the causes and effects that arise in social relations among persons and in the intercommunication and interaction among persons and groups. It includes the study of the customs, structures, and institutions that emerge from interaction, of the forces that hold together and weaken them, and of the effects that participation in groups and organizations have on the behaviour and character of persons. Sociology is also concerned with the basic nature of human society, locally and universally, and with the various processes that preserve continuity and produce change (21, V. 16).

Once again, the field can be traced back to the Greeks, but the first academic department was not created until 1892 at the University of Chicago. The history of the field shows a complex relationship with other disciplines. Early thinking in the field was shaped by social Darwinism and evolutionism, determinism (economic, environmental, biological), and early functionalism. According to *Britannica*, modern major directions of interest in sociology total four: functionalism and structuralism, symbolic interactionism, modern determinism, and mathematical modelism.

The article contains a lengthy discussion of methodological considerations in contemporary sociology, which I found to be quite impressive. But an equally lengthy and weighty section pondered the status of contemporary sociology, including its scientific status and the criticisms leveled at it. It closed by considering the future of the field, but, overall, the article did little to offer a clear and concise classification of it.

Needed: A More Integrated Approach

Taxanomic problems within the social sciences are greatly exacerbated by the blinders worn by members of each of its professions. Much of the lack of communication between disciplines and narrow outlook of each discipline is caused by overspecialization. Professional specialization was the natural response as scientists attempted to cope with the knowledge explosion of the past 200 years, but it has both benefits and costs. With specialization social scientists can understand more about the exact nature of social systems, but this very specialization coupled with rapid change makes it more difficult to gain widespread understanding of the nature of change itself. Regarding specialization, Boulding has noted humourously, "One wonders sometimes if science will not grind to a stop in an assemblage of walled-in hermits, each mumbling to himself words in a private language that only he can understand" (8, p. 85).

Recognizing the problems imposed by extreme specialization, social scientists increasingly have called for more interdisciplinary or multidisciplinary approaches to the problems at hand. Such rallying cries, however, have been given so often that they have tended to become cliches. The difficulty is that, as presently conceived and taught, there is little conceptual unity among the social sciences, with each having a vocabulary and structure of its own. Typically, the interdisciplinary or multidisciplinary approaches yield nothing more than a historical or philosophical survey, a problems approach, the little-bit-of-each discipline approach, or multidiscipline, multi-instructor courses.

There has been an increasing recognition in recent years, however, of the necessity of moving forward toward a more general theory of social science. This is based on the belief that all social sciences study essentially the same thing, which is the social system, even though they are studying it from different viewpoints and using different vocabularies. The idea is to collaborate not by relating disciplines, but by pulling them apart and reconstructing them in a new more single form. Such an approach can increase efficiency via unifying concepts and through a conceptually integrated vocabulary.

Obviously, such a task is complex, but I find some hope in this direction in the work of people such as Boulding (8, 10), Heilbroner (24), and Alfred Kuhn (28, 29, 30).[2] Kuhn's work especially has not received the attention I feel it deserves. These men have undertaken a serious attempt to apply a more unified logic to the social system. Kuhn's main aim has been to put the central core of social science on a more deductive basis similar to the central body of economic theory. His purpose has been unification, not to eliminate or undercut specialties, but to provide them with a common set of analytic underpinnings.

I shall only give a couple of hints at the results to date of this work. Kuhn believes, for example, that the basic social science discipline structure is one of communication (sociology), transaction (economics), and organization (political science) (30). He believes that no organization can function without a detector-selector-effector (DSE) apparatus (28). These plus detailed elements are approached through a structure based in systems analysis.

This effort toward a more systematic, problem-centered approach deserves our consideration. A complete logical body of theory covering the whole social system will not be easy, but many bits and pieces are now present. This holds promise for fewer, more comprehensive, more integrated taxonomic systems for the social sciences. Increased efficiency also would result through having a broader paradigm in our minds rather than having to continually attempt to "committee" in a multidisciplinary context with those of other social science disciplines. In other words, we would be able to reason from broad general principles and a common core vocabulary to the particular questions in the specialized field if such a social science overview theory existed. This would be in contrast to the present state of affairs where we reason from specific cases to the general case to see if a commonality exists between the disciplines—and we are greatly hindered in the process by the lack of a common taxonomic system and vocabulary.

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[2] Alfred Kuhn's work should not be confused with that of his namesake Thomas S. Kuhn who wrote "The Structure of Scientific Revolutions" (31). T. S. Kuhn disputes the cumulative concept of scientific change and believes that a careful study of the history of science reveals significant conceptual and methodological discontinuities sometimes of revolutionary proportions. Thus, his views are of importance to those interested in taxonomic systems and how they change, but space does not permit a full discussion. Suffice it to note that he has had considerable impact among political scientists ranging from initial broad acceptance to more recent one of significant rejection. Criticism of his original thesis has led to a theory of permanent scientific revolution. For a discussion of his influence on the political science profession, see (3).

Unfortunately, this day of theoretical social science nirvana did not arrive prior to the Conference and we still must operate in a multidisciplinary context. Thus, I shall not be able to audaciously develop a generalized taxonomy below. Rather, I shall attempt to show how the three major fields represented (economics, political science, and sociology) relate in the field of community services and where there their strengths appear to rest in this field. Only a very modest beginning at true integration is claimed.

PROBLEMS OF DEFINITION

Before moving to present my taxonomic system, I feel we should clarify three basic terms. Frankly, the expression "nonmetropolitan community services" is a mouthful. Because the Conference involves professionals drawn from three major social science disciplines and people from both inside and outside the USDA-Land Grant system, I shall briefly discuss each of these basic terms in turn. This should help avoid communication problems arising out of the wrong use of these terms.

Nonmetropolitan

Perhaps the most troublesome term is "nonmetropolitan," meaning different things to different people. For the purposes of this Conference, it may be defined as the non-SMSA counties as well as the open country and towns of 2,500 or fewer people located outside the urbanized areas of 50,000 or more population of SMSA counties.[3] However, there are enough complexities involved that we need to briefly review the situation.

First, let us consider some problems of definition. The urban population comprises all persons living in urbanized areas and in places of 2,500 inhabitants or more outside urbanized areas. The population not classified as urban constitutes the rural population. The rural population is subdivided into rural-farm population, which comprises all rural residents living on farms, and the rural-nonfarm population, which comprises the remaining rural population.[4]

A look at the data for each of these concepts shows some interesting relationships and overlaps (table 1). For example, 30 percent of all rural people lived inside metropolitan (SMSA) areas in 1970. Some 18 percent of the farm population lived in such areas. In contrast, 18 percent of the urban population was located in nonmetropolitan areas. In 1970, 123.0 million of the total U.S. population of 203.2 million people or 60.5 percent were classed "urban metropolitan." Thus, our usage of the term "nonmetropolitan" for purposes of the Conference indicates a residual segment of the population remaining after the "urban metropolitan" portion is defined. It is not a tidy concept because our definitions of urban and metropolitan are quite complex.[5] Nevertheless, it is a needed construct to focus on people and communities with largely similar types of problems and research needs.

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[3] An SMSA (Standard Metropolitan Statistical Area) is a county or group of contiguous counties which contain at least one city of 50,000 inhabitants or more, or twin cities with a combined population of at least 50,000. In addition, contiguous counties are included in an SMSA if according to certain criteria they are socially and economically integrated with the central city. An urbanized area consists of a central city, or cities, with a population of 50,000 inhabitants or more and surrounding closely settled territory. For detailed definitions see (39).

[4] The farm population consists of persons living on 10 or more acres from which sales of farm products amounted to $50 or more in the preceding calendar year or on places of less than 10 acres from which sales of farm products amounted to $250 or more the preceding year.

TABLE 1.—RURAL FARM AND RURAL NONFARM RESIDENTS IN METROPOLITAN AND NONMETROPOLITAN AREAS OF THE UNITED STATES, 1970 [a]

Residential status	Metropolitan		Nonmetropolitan		U.S. total	
	Number of people (millions)	Percent	Number of people (millions)	Percent	Number of people (millions)	Percent
Total	139.4	69	63.8	31	203.2	100
Urban	123.0	82	26.3	18	149.3	100
Rural	16.4	30	37.5	70	53.9	100
Nonfarm	14.9	33	30.7	67	45.6	100
Farm	1.5	18	6.8	82	8.3	100

[a] This table reflects data delineations published in the 1970 census of population. Since the publication of these data metropolitan reclassification has reduced the nonmetropolitan population to 54,400,000 or by 9,400,000 from the 63,800,000 figure listed above (11). However, the internal vertical breakdown within the nonmetropolitan and metropolitan categories shown above is not available on the basis of a 54,400,000 nonmetropolitan status. Thus, the data were presented on the basis of 63,800,000 nonmetropolitan people in order to gain some insight into the definitional problems involved.

Source: (40, p. 1:413.)

Community

The terms "community services," "social services," and "public services" often are used somewhat synonymously. This should not be done, however, because the concepts differ. For instance, the pure Samuelsonian public or collective consumption good is a fairly narrow concept defined so that "each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good" (35, p. 387). In other words, pure public goods are not subject to the exclusion principle. Governments typically provide a much broader range of services than those which can be defined as Samuelsonian public goods. Thus, the term "government goods" is more useful, because it is a much more encompassing concept simply indicating those goods and services provided by government. The reasons given by economists for governmental provision of goods and services thus include not only collective goods, but also, among others, those processes creating externalities, having extraordinary risks, and having decreasing costs (natural monopolies). Or the intervention may be to provide initiative, change the pattern of consumption, or redistribute income (16; 20, pp. 8–13). In the broadest sense, the dictionary definition of "public" implies the "community" at large, but then we are left with the task of defining "community."

Warren notes that the term "community" implies something both psychological and geographical (41, p. 6). Psychologically, it suggests shared interests or association such as "the business community." Geographically, it implies a specific area where people are grouped together. Sociologically, the term combines these two concepts. Warren thus defines a community as "that combination of social units and systems which perform the major social functions having locality relevance" (41, p. 9). This definition allows for both public (governmental) and private (non-governmental) activities under a community concept. In my opinion, this definition most closely meets the intended focus for the Conference by the Planning Committee.

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[5] Neither has the definition of nonmetropolitan been easy to handle in a programmatic sense. For instance, USDA's Farmers Home Administration (FmHA) now makes community facilities loans in towns of up to 10,000 persons, housing loans in places of up to 20,000 population, and business and industrial loans in places of less than 50,000 people.

Services

The term "services" probably causes the least difficulty of the three. It refers to any work or activity of immediate economic value to another, or the provision of some facility (such as power, heat, or transportation) (37, p. 397). Used generically in the community context it can also include tangible goods or commodities and the work involved in producing them.

The term "services" also has other meanings in economics. They are the component of gross national product that measures the output of intangible items. Or they can be all other activities (besides primary and secondary) including transportation, communication, trade, finance, professional, personal, and government, as used in economic base analysis. However, such concepts are unlikely to provide confusion for our purposes.

Difficulties are most likely to arise over the nature of the community service itself and with the modifier employed with the word "service." The nature of the service can include its capital or labor intensity, output orientation (people versus physical), and type of provider. In the last context, it is important to reiterate that such services may be provided by both the governmental and private sectors. Health and education are prime examples of such a public-private mix.

A TAXONOMIC FRAMEWORK

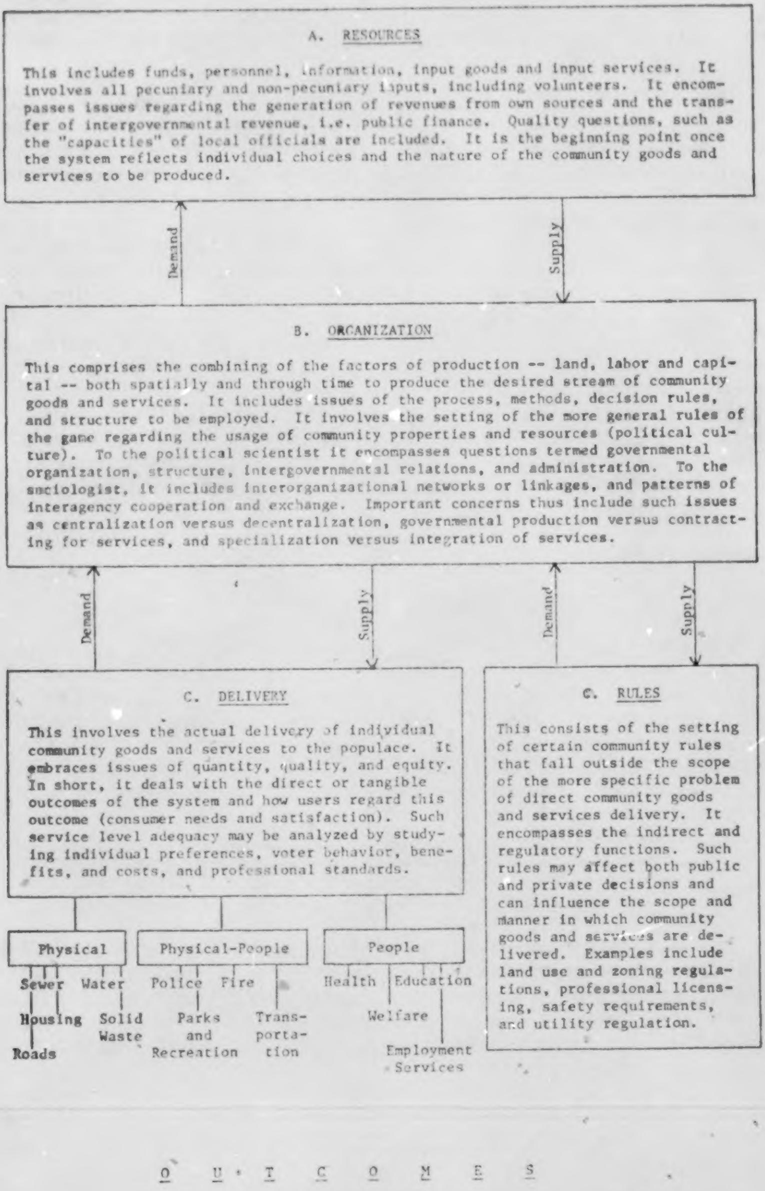
I am now ready to present a taxonomic framework for nonmetropolitan community research. In view of the preceding discussion, I do so with the utmost respect for the problems involved. I am aware of some of the attempts of others to address this problem in part or total. These include writings by Carruthers and Urquhart (12), Cordes (16), Gessaman (23), Hildreth and Schaller (25), Hitzhusen and Napier (26), Jones and Gessaman (27), and Schreiner (36). My general thrust differs to varying degrees from these, but I found them to be generally helpful in approaching this problem.

I shall first discuss the framework and then relate the Conference to it.

Framework

The basic taxonomic framework is outlined in figure 1. It shows resources being organized to produce both direct and indirect community service outcomes. Or conversely, it illustrates that certain community service outcomes are demanded by the public and they must be met via certain organizational and resource requirements.

Figure 1--A Diagrammatic Sketch of the Community Services Delivery System



A. RESOURCES

This includes funds, personnel, information, input goods and input services. It involves all pecuniary and non-pecuniary inputs, including volunteers. It encompasses issues regarding the generation of revenues from own sources and the transfer of intergovernmental revenue, i.e. public finance. Quality questions, such as the "capacities" of local officials are included. It is the beginning point once the system reflects individual choices and the nature of the community goods and services to be produced.

B. ORGANIZATION

This comprises the combining of the factors of production -- land, labor and capital -- both spatially and through time to produce the desired stream of community goods and services. It includes issues of the process, methods, decision rules, and structure to be employed. It involves the setting of the more general rules of the game regarding the usage of community properties and resources (political culture). To the political scientist it encompasses questions termed governmental organization, structure, intergovernmental relations, and administration. To the sociologist, it includes interorganizational networks or linkages, and patterns of interagency cooperation and exchange. Important concerns thus include such issues as centralization versus decentralization, governmental production versus contracting for services, and specialization versus integration of services.

C. DELIVERY

This involves the actual delivery of individual community goods and services to the populace. It embraces issues of quantity, quality, and equity. In short, it deals with the direct or tangible outcomes of the system and how users regard this outcome (consumer needs and satisfaction). Such service level adequacy may be analyzed by studying individual preferences, voter behavior, benefits, and costs, and professional standards.

C. RULES

This consists of the setting of certain community rules that fall outside the scope of the more specific problem of direct community goods and services delivery. It encompasses the indirect and regulatory functions. Such rules may affect both public and private decisions and can influence the scope and manner in which community goods and services are delivered. Examples include land use and zoning regulations, professional licensing, safety requirements, and utility regulation.

I feel that the utility of this classification system is its basic straightforwardness. It has been a useful tool allowing me to more effectively classify the projects in this area of concern within the Economic Research Service. A basic boundary is placed around the entire subject in question and some hints are given at internal organization and content. In developing this scheme, I have abstracted from what Hitzhusen and Napier term "research designs and measurement" (26). I feel that it is obvious that rural communities differ and that research techniques, which typically are not specific to rural situations anyhow, must vary with the problem at hand. But this does not require that they be separate blocks in a taxonomic scheme. However, I have subsumed within my taxonomic system what Hitzhusen and Napier label in a separate block "rural community variation." Community variation concerns permeate my scheme, but are especially important in the resources area.

Let's now briefly consider each of the blocks in figure 1.

Resources.—Historically, this area of concern has been dominated by economists in general and those with an interest in public finance in particular. The financial concerns are not wrong, but I feel that the public finance economists perhaps have been too aloof from both nonfiscal resources and some of the other boxes. They have developed an impressive theoretical system internal to the finance area, but have not concerned themselves with such outside questions as final community service outcomes as much as they might have. This includes insufficient attention to the linkages between who pays and who uses services. In short, I feel that more attention is required on the distributional and redistributional effects of various public services and how these vary with the type of financing and taxation used. Also, other resource items are receiving increasing attention in this research arena. Voluntarism is a case in point.

Organization.—This box is a major concern of all three fields—economics, political science, and sociology. Economists have restricted their scope to a considerable degree in this area tending to employ production and cost theory to solve problems. Political scientists have had a major interest in this topic. Their concerns include not only those noted in the box (B), but range to include decisionmaking rules (empirical democratic theory), the role of political parties and interest groups, voting behavior and elections, and the relationship of formal structures and the actual processes of governments. Sociologists have made increasing contributions in this area in recent years as a result of their interest in organizational analysis, networks, and linkages.

Delivery.—Various criteria have been advocated for analyzing the output of community services. Hitzhusen and Napier note 12 service policy criteria: (1) output measurability, (2) capital or labor intensity, (3) relative cost, (4) size or scale economies, (5) externalities or spillovers, (6) growth versus maintenance emphasis, (7) number and complexity of technical alternatives, (8) income redistribution, (9) merit

> good attributes, (10) ease of excluding users, (11) political proximity, and (12) unanticipated social consequences (26). We could argue with and add to or subtract from this list, but I think we could all agree that each of the fields have made major contributions here. In this respect, I feel that some of the recent advances made by sociologists in the area of multiple measures of social indicators are quite interesting in their potential application to the subset of outcomes (community services) in which we are interested (13, 15).

A number of services are arrayed in figure 1 according to their output orientation—physical (services which influence, alter, and determine the physical and biological environment of a community), physical-people (services which influence both the physical-biological environment of a community and the behavior patterns of individuals in the community, i.e. joint physical and social services affecting the environment of the community), and people (services which directly affect the individual in a nonphysical sense and therefore affect the social environment of the community members). I find this distinction useful. It first appeared in a study of the Stockton, California metropolitan area by McCalla, Cauchois, and Hackett (32), but is more readily available in *Priorities in Community Services Research in the Northeast* (34).

It should be noted in passing that community services may be either a final or intermediate output. They perform a variety of functions including enhancement of the stock of human capital, serving as an economic base, and attracting industry to nonmetropolitan areas. Thus, they are much more than a simple final output, but function as a part of a complex system.

I would like to comment regarding research and the relationship between the organization and delivery areas. Obviously, studies in the delivery area often will have implications in the organizational area. But the impact also can range from a selective one to none at all. For example, a technical engineering size economies study for sewage treatment plants in a county may in some cases have negligible impact on most organizational concerns. The decision to build one large versus two small plants in the given service area obviously would not, for instance, impact on whether the county had a county executive or commissioner form of government. Similarly, I can envision a needs assessment study of a given service in different areas that finds that all organizational concerns are nearly identical and not a problem, but that different funding levels are in need of change.

This is not to say that the relationship between the organization and delivery areas is simple, because it is not. The difficulty is that organization covers such a wide range of issues and activities ranging, for example, from multicounty governments to townships and special districts; to more micro concerns regarding the number, size, and location of elementary, intermediate, and secondary schools; and from local production of services to performance contracting. When one focuses on organization, it thus needs to be noted that alternative organizational patterns can be expected to have differential impacts on the output of the system in terms of such items as quantity, quality, costs, and citizen satisfaction.

Rules.—This area of concern is as much or more the domain of the legal profession as it of the three major social science disciplines represented at the Conference. This is not to say that each has not made its contribution and, among economists, the work of the institutionalists should be especially noted. A separate break-out of rules does not deny their existence throughout the system. Obviously, they may be an input to or an output of the system. Both are vitally important. However, here we are more interested in indirect or regulatory functions that are intended more as intermediate or final outputs of the system.

The Conference

I shall now attempt to relate the Conference to the above framework. In working toward the specific items on the agenda, the Conference Planning Committee had to evaluate the priorities among and within each "box" in figure 1. Such a sorting had to be practical to avoid the problem illustrated by the debate among economists in the 1920's over Clapham's empty economic boxes (14). It was particularly debated at that time whether the theoretical sorting of industries into boxes labelled "diminishing return" and "increasing return" could be turned into practical account. Thus, there is a danger in not only overclassifying but there also is a tendency for classification systems to become part of conventional wisdom. This is fine when they reflect "proper" priorities, but otherwise progress is hindered.

In the field of community services research rigid determination of direction and weighting of priorities is not easy. One must not let the whims of the daily political decisionmaking process become the dominant selection criteria. A balance of criteria must be employed including relevance, significance of problem area, resource availability, and current status of research (34). The Planning Committee utilized such criteria and at the same time attempted to keep the Conference manageable. With respect to the latter, the rules area (box D of figure 1) was not included as such in the Conference. This is not to deny the existence of important problems in this area, but we wanted to deal with tangible or direct service outputs. Moreover, subjects such as land use can comprise an entire conference agenda.

Let's now consider the content in relation to the remaining boxes.

Resources.—The focus in this area is on public finance. It was divided into two areas—fiscal needs and intergovernmental revenues. The New York financial crisis has received much attention, but rapid inflation and rising services expectations have caused problems for the smaller units as well. In the first section, the major paper addresses the current overall concern in this area. The special papers focus on: (1) some of the implications of non-tax financing for rual community services, (2) the wealth neutral property tax, and (3) the municipal bond market.[6] The wealth neutral tax has received attention since the *Serrano* decision, and research on the municipal bond market is severely lacking in the USDA-Land Grant complex.

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[6] Major papers address broader issues or subject matter fields; special papers focus on more specific issues and are approximately half the length of the former.

The major paper in the second section addresses the intergovernmental revenues question from the perspective of the smaller governments. The first two special papers deal with examples of intergovernmental revenue questions in a more specific context by focusing on some general revenue sharing issues. The last special paper examines one way the system could help cope with local fiscal difficulties by using a State revenue sharing plan. A proposal for New Mexico is presented.

> *Organization.*—This field is divided into two areas—public choice and coordination. The first section is on public choice—an area of interest that has received increasing attention in the USDA-Land Grant system in recent years. Two of the papers are from the public choice perspective in the traditional sense. The major paper looks at research issues for nonmetropolitan areas from such a perspective while the last special paper looks at nonmetropolitan special districts from this paradigm. The other two special papers are from the public choice perspective in the broader sense of the term. The first examines how selected town councils make decisions in Washington State and the second deals with experience to date with the local government voter review mandated by the 1972 Montana constitution.

The second section focuses on intergovernmental organization and management problems. An effort was made to obtain insights from different outlooks. The major paper examines these questions from a public administration perspective. The first special paper addresses the problem of intergovernmental cooperation in Canadian rural development programs. A sociological view of coordination is presented in the last special paper.

> *Delivery.*—The considerable variety of organizational opportunities was highlighted above. Research on service delivery systems should provide at least some basis for ex ante evaluation of the feasibility and appropriateness of alternative organizational structures for the delivery of services in a variety of community contexts. Earlier, I referred to a list of 12 service policy criteria. Clearly, we cannot devote detailed attention to each of these because of time limitations. Three areas of concern were thus selected: (1) needs and use assessment, (2) conceptual bases and measurement of quantity, quality, and consumer satisfaction, and (3) service cost-quality-quantity relationships.

The fifth Conference section addresses the problem of needs and use assessment. The major paper reviews the literature dealing with the demand for public services. One special paper takes a different tack to assess the needs for health services. Another draws heavily on a North Central Regional research project designed to assess the needs for community services at the local level. The third special paper presents a critical review of preference surveys as a needs assessment tool.

The sixth Conference section begins with a major paper dealing with the conceptual bases and measurement of multiple indicators of public service output. One special paper addresses the specific conceptual and measurement problems of the output and quality of health services. The final special paper deals with the quality of solid wastes as it affects the feasibility of partial or total recovery.

The last Conference section addresses service cost-quality-quantity relationships. Here the format changes slightly with two major and two special papers. The first major paper draws on extensive experience in urban settings and emphasizes the cross sectional statistical approach. The second major paper emphasizes the engineering economic approach to cost estimation. One special paper presents a method of adapting research-derived cost estimates to specific local situations. The final paper in the section presents an approach to decisionmaking under conditions of multiple goals.

CONCLUSIONS

Research on nonmetropolitan community services is important today in the face of overall population growth and shifts within this sector coupled with changing service needs and rising service expectations. Effective conduct of this research must be based on a system of priorities which, in turn, require a taxonomic framework. Indeed, such a classification system is needed to help allocate scarce research dollars for the greatest research payoff.

We have examined three taxonomic systems within the physical and biological sciences and found them to be regarded as useful predictive pedagogical devices by the scientists working in these fields. Such systems require time and effort to develop, but can serve as yardsticks with which to plan and compare research work. Often they have broad implications and are useful devices even when all members of a discipline cannot agree on which one to use or on the exact details of the one employed. Indeed, this can be healthy as classification systems must not be allowed to become rigid ends in themselves or to cause us to think we understand something simply because we are able to fit it into such a system. Thus, such systems must be adapted to meet multiple needs and new, changing evidence.

We learned that the taxonomic task is much more difficult in the social sciences, but the payoffs to such efforts are just as great. In order to facilitate nonmetropolitan community services research, a taxonomic system was developed for the field, which includes input from economics, political science, and sociology. The entire field was divided into four areas—resources, organization, delivery, and rules.

Based on this taxonomic system, the Conference Planning Committee developed a format for the Conference. The resulting papers show a set of priorities based on one classification system at one point in time. The Committee hopes that these papers help to focus and further more effective research on nonmetropolitan community services and that the resultant volume of Conference proceedings thus becomes a useful reference. Moreover, the Committee recognizes that a classification scheme typically implies a set of priorities and in this area these must continually be examined in the future to reflect new needs and evidence.

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PART II: RESOURCES

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FISCAL NEEDS AND RESOURCES OF NONMETROPOLITAN COMMUNITIES

[By Frederick D. Stocker*]

The supposition that underlies this paper—and presumably this entire Conference—is that small towns and rural areas are not immune to the fiscal difficulties that have afflicted the Nation's larger and more prominent local governments. While the problems of New York City and a few other major municipalities have occupied the front pages, and while it has become a favorite guessing game to predict which major American city will be the next to go down the tube, smaller communities have been struggling with fiscal problems of their own, which—allowing for the difference in scale—are not necessarily any less difficult. What township or village, after all, can expect to get special bail-out legislation through the U.S. Congress, or even through the State legislature?

One reason for doubting that the problem is unique to large cities is that the causes are not unique. Various analyses have been put forward to explain the fiscal crises affecting American cities, and less directly, States. Various remedies have been offered. Some say the problem is simply that citizens and their political leaders want more public services than they are willing to pay for—a familiar dilemma that we face every day in our private affairs and which is properly met by belt tightening. Others stress the weakness in the national economy which has cut heavily into State-local revenues while adding to their expenditures, and they emphasize policies to pump up the national economy as the way to help local areas. The New York crisis has spotlighted fiscal mismanagement as a cause of financial difficulty. And public employee unions are sometimes blamed and ways are sought to break the unions' power.

Some see the essence of the problem in structural terms—a mismatch between needs and resources in which local units have most of the problems while the Federal Government and the States have all the good taxes; or an inappropriate structure of local government in which benefit areas do not conform to the boundaries of local service delivering units; or a fragmented revenue structure, in which some communities have superabundant taxable resources while their neighbors have little to tax; or a set of constitutional, statutory, or political constraints on revenues that prevent citizens from being able to accomplish their desired level of support of public services.

Fortunately, it is not necessary for me to try in this paper to analyze, criticize, or assign weights to these various perspectives on the fiscal problems that beset local governments. It seems that all hold some plausibility and no doubt each is central in some communi-

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ties. The point I would stress is that few of these problems are unique to larger, metropolitan communities. Not only logic, but the evidence as well suggests that residents of small towns and rural communities, along with their political leaders, feel themselves caught in the same fiscal bind and cite the same fundamental causes. One need only speak with a random cross section of public officials from nonmetropolitan areas to recognize the pervasiveness of the local fiscal crunch. Periodically the problem spills over onto the pages of the local (or even the national) press, as in the national attention focusing at this writing on the impending shutdown of public schools in the Groveport-Madison School District near Columbus. The school district simply ran out of money.

I am willing to assume, in short, that there is a genuine fiscal crisis facing many rural units of government, that its causes are varied and complex and the solutions elusive, and that we are not wasting our time considering policy options and research needs relating to the delivery and financing of public services in nonmetropolitan communities.

In this paper I shall try, in keeping with my instructions, to give an overview of public service needs in nonmetropolitan communities and of the public revenue resources they can draw on in meeting these needs. I shall try to identify policy options and research needs. And, while fiscal issues are closely linked with issues concerning governmental organization and service delivery systems, I shall leave these topics to other speakers.

PUBLIC SERVICE NEEDS

A discussion of "public service needs" gets into serious trouble at the very outset, for each word of this phrase presents problems. To start with, the word "public" implies a clear differentiation between the public and private sectors, though as we all know the distinction is nebulous and not always useful. Public goods theory makes clear that publicness is a matter of degree rather than of kind and that assignment of certain activities to government and others to the private sector is often a matter of tradition, or chance. Some goods that urban areas typically include in the public sector are private goods in rural areas, (*e.g.*, water, sewers, and to some extent police protection). And it is common, especially in rural areas, to find public (or social) goods supplied through nongovernmental mechanisms, e.g., the volunteer fire department or the VFW baseball field.

The problem becomes even more complicated when we come to defining "service." Clearly the product that taxpayer-consumers are basically demanding is not really, for example, "police protection." Police protection is only a means by which the more fundamental product "safety of persons and property" can be obtained.[1] A community that spends a great deal on police protection may (and in fact is likely to) be less safe than one that spends little or nothing. In a totally law-abiding community, safety is free good and no one need pay anything to acquire it. But where crime is rampant, safety is scarce and valuable, and massive public expenditure may be devoted to its pursuit. The relevance of this for appraising rural public needs is the lack of a service, presumably because an effective demand does not exist may indicate only that the problem itself does not exist at a threshold level.

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[1] This distinction, between the fundamental consumer want that a public service meets and the proximate objective of public expenditure (the thing produced), is developed by D. F. Bradford, R. A. Malt, and W. E. Oates in "The Rising Cost of Local Public Services: Some Evidence and Reflections," *National Tax Journal*, June 1969, p. 185–202.

This brings me to the third problem term, "need." Every beginning student of economics learns to avoid that term. He is taught that in economics there are no needs, only wants, and that wants are essentially limitless. Disregarding this elementary principle, I suggest that we can make some sense of the term "need," as applied to public services, if we think of "need" as arising from a welfare-diminishing condition that can only (or best) be met by social action. It is an opportunity for collective (though not necessarily governmental) action that will generate benefits in excess of costs. A public service "need" arises when there is (1) a gap between what is and what ought to be and (2) a course of collective action that promises to close that gap. Public service needs arise not only out of problems that worsen citizens' condition (e.g., a crime wave) but also out of newly perceived opportunities for social consumption (*e.g.*, a municipal stadium) and out of technological advances that make it possible to do something about problems that previously were insoluble (*e.g.*, pollution control).

The relevance of this to the topic at hand is to caution that analysis of expenditure patterns, useful though this may be, cannot tell us much about the quality or quantity of public service delivered, or about the outcome in terms of consumer welfare or about public service needs, as perceived by citizens. The foregoing suggests also the possibility that there may be room for creative thinking and research on the perception by rural people, as contrasted with urban of their condition in terms of safety of persons and property, purity and adequacy of water supply, adequacy of sewage and solid waste disposal, humane care of the aged, infirm or indigent, and the like. Understanding of these things seems to me to be a prerequisite to knowing what kinds of collective activity may be in order to satisfy public service demand.

Some Specific Public Service Problem Areas

Useful and essential though it may be, statistical analysis does not really tell us much about what problems (needs) local people themselves perceive. For this we need to draw on the first hand observations of those who live and work in nonmetropolitan areas. Here are a few of the problem areas that such people mention:

(*a*) *Roads and bridges* need to be upgraded and better maintained. Revenues from gas taxes and motor vehicle licenses have not kept up with rising costs of maintaining the rural transportation network.

(*b*) *Crime* is apparently becoming a more serious problem in many rural areas, taxing the capability of limited rural law enforcement systems.

(*c*) *County homes* for the aged and/or infirm are typically obsolete. Many rural counties face a choice of renovating and rebuilding and to bring facilities for the aged up to HEW standards, or closing.

(*d*) *Water systems* are becoming a problem. Many communities have grown to the point where a community water system may be more efficient, but the tax base and borrowing capacity may be inadequate to the purpose. FmHA community facilities loans are said to be hard to get.

(*e*) *Social services* to the aged, (*e.g.*, Meals on Wheels), are often inadequate or nonexistent.

(*f*) Rural *jails* are often antiquated and inadequate.

(*g*) *Emergency ambulance service* is inadequate or nonexistent, especially with the withdrawal of funeral homes from this activity.

(*h*) *Welfare* costs impose a rising burden on local areas in those States that do not themselves bear the entire nonfederal share of welfare costs.

(*i*) *Solid waste disposal* is becoming more of a problem as dumps become filled up and/or closed. Waste collection is costly and in most rural places, nonexistent.

(*j*) *Waste water* presents a problem as villages that formerly relied on septic tanks are increasingly being forced to install sewer systems. Many places that already have sewer systems are faced with the necessity to increase their capacity and upgrade treatment facilities.

(*k*) An increasing number of rural areas are facing the necessity of adopting (and enforcing) *land use controls* and *subdivision regulations*.

EXPENDITURE PATTERNS

Having just said that expenditure data are of little value for our purpose, it is with some diffidence that I turn now to a cursory review of these data. It is, after all, of some importance to know how much money is involved and where it goes if we are to obtain a grasp on the fiscal dimensions of the problem.

The overall level of local government activity in those parts of the United States that lie outside SMSA's would appear to be distinctly lower than that found in SMSA's, if expenditure is taken as the measure. The Census of Governments reports that the 74 largest SMSA's (those with population over 500,000), containing 54.1 percent of the Nation's population in 1973, did 63.2 percent of the spending. In per capita terms, this means that local governments in the 74 largest SMSA's spent $697 per capita, compared with $473 for those in the rest of the Nation (table 1).

TABLE 1.—DIRECT GENERAL EXPENDITURE OF LOCAL GOVERNMENTS, METROPOLITAN AND NONMETROPOLITAN AREAS, 1973–74

Item	All local governments	SMSA's	Outside SMSA's
Direct general expenditure (millions)	$124, 668	$79, 158	$45, 510
Population (1973) (millions)	209. 8	113. 4	96. 3
Per capita expenditure	$594	$697	$473

Source: U.S. Department of Commerce, Bureau of the Census, "Governmental Finances in 1973–74," table 5; and "Local Government Finances in Selected Metropolitan Areas and Larger Countries, 1973–74".

Of course, a two way split between the largest SMSA's and the rest of the country does not do much to illuminate the expenditure profile of the very smallest units, with which we are concerned here. Census data for city government finances are a little more helpful, indicating a consistently declining per capita expenditure average for municipalities as population rises; those with population under 50,000 spent less than a fourth as much per capita as those with a million or more inhabitants (table 2). More detailed data for 1971–72 show that the pattern of declining per capita expenditure with declining population size extends throughout the entire range of municipalities. The smallest towns (those under 2,500) spend less than $100 per capita, or only about one-third as much as the average for all municipalities (table 3).

TABLE 2.—PER CAPITA AMOUNTS OF SELECTED CITY FINANCE ITEMS BY POPULATION-SIZE GROUPS: 1974–75

Item	All municipalities	Municipalities having a 1973 population of— 1,000,000 or more	500,000 to 999,999	300,000 to 499,999	200,000 to 299,999	100,000 to 199,999	50,000 to 99,999	Less than 50,000
General revenue	367.31	921.60	519.79	412.98	392.56	335.96	285.73	196.34
Intergovernmental revenue	144.76	437.83	216.68	156.07	153.57	118.60	90.76	62.84
From State Governments	96.17	362.57	105.17	81.37	81.49	68.56	54.03	37.10
From Federal Government	43.06	70.34	100.82	64.68	60.96	42.73	33.49	21.84
General revenue sharing	16.27	26.46	21.36	19.81	19.79	17.26	14.72	11.79
From local governments	5.52	4.92	10.70	10.03	11.12	7.31	3.24	3.90
General revenue from own sources	222.55	483.77	303.11	256.90	238.98	217.36	194.97	133.51
Taxes	155.72	377.60	231.33	160.59	158.92	152.29	136.32	87.26
Property	96.12	198.07	121.37	91.15	96.16	110.52	100.71	56.74
General sales and gross receipts	20.40	56.05	29.33	20.17	17.32	16.50	16.53	10.35
Selective sales and gross receipts	13.16	34.86	21.74	17.19	20.19	11.31	7.32	10.47
Other	26.04	88.61	40.77	32.07	25.25	13.96	11.76	10.47
Current charges	10.10	63.60	54.64	55.80	45.71	39.83	36.62	28.96
Miscellaneous general revenue	26.73	42.57	35.25	40.51	34.36	25.24	22.04	19.78
General expenditure, all functions	358.65	844.44	531.95	413.96	395.31	340.66	295.62	193.55
Capital outlay	70.56	116.63	98.58	93.32	83.85	74.08	64.35	48.64
Other	288.09	727.81	433.38	320.64	311.47	266.58	231.27	144.91
Education	52.78	153.76	71.70	66.50	56.81	59.29	46.96	18.00
Other than capital outlay	46.48	133.22	60.95	59.37	54.88	53.10	42.72	15.94
Highways	28.45	26.37	36.24	26.32	31.37	28.13	30.49	27.03
Other than capital outlay	16.14	14.83	14.56	14.03	15.06	15.76	15.89	17.32
Public welfare	28.34	162.70	45.75	3.51	15.58	6.79	2.66	1.08
Cash assistance payments	11.74	63.03	24.30	1.53	11.22	3.07	.98	.24
Hospitals	20.15	78.52	30.91	9.57	11.36	9.19	11.11	7.65
Other than capital outlay	18.82	75.71	28.73	7.64	9.49	8.39	10.66	6.69
Health	6.68	23.05	17.35	8.18	6.18	4.55	2.22	1.20
Police protection	38.91	73.32	57.77	47.64	40.17	38.18	33.46	25.49
Fire protection	21.37	28.80	30.09	30.83	28.19	27.57	24.48	13.70
Sewerage	25.16	30.07	30.89	35.03	26.37	26.30	21.12	22.06
Other than capital outlay	8.55	5.65	10.90	9.94	9.19	9.05	7.74	8.78
Sanitation other than sewerage	12.99	23.04	16.90	16.26	17.23	12.43	10.12	9.45
Parks and recreation	16.75	17.18	27.71	29.00	22.56	21.77	18.47	10.97
Housing and urban renewal	12.91	40.13	14.94	21.00	20.52	12.78	10.63	3.74
Other than capital outlay	6.23	23.19	7.50	8.58	8.92	5.12	4.14	1.38
Libraries	4.65	8.46	6.69	4.72	5.82	5.23	5.05	2.83
Financial administration	6.03	7.93	8.62	7.21	7.21	6.54	5.76	4.70
General control	10.61	17.87	15.24	8.54	10.38	9.45	8.63	8.59
General public buildings	6.23	8.54	6.76	6.07	7.65	6.76	6.34	5.22
Other than capital outlay	3.59	6.16	5.51	3.57	3.44	3.49	3.78	2.43
Interest on general debt	16.90	48.68	20.59	22.10	22.97	13.66	10.79	8.16
All other	49.73	96.01	93.81	71.48	64.95	52.04	47.35	23.68
Water supply revenue	24.06	26.44	27.22	26.82	26.31	23.10	21.95	22.97
Water supply expenditure	27.82	24.88	28.44	30.35	30.32	25.27	26.66	28.88
Current operation	14.82	10.80	15.73	15.66	15.58	14.27	14.70	15.78
Capital outlay	9.94	10.01	10.33	10.73	11.84	8.57	9.81	9.94
Interest on debt	3.05	4.08	2.38	3.96	2.90	2.43	2.15	3.16
Other utility revenue	36.48	60.52	49.86	17.65	23.57	45.96	23.84	31.28
Other utility expenditure	43.85	104.51	61.23	18.65	24.39	50.59	25.83	30.47
Current operation	32.57	74.63	41.69	15.05	15.58	35.77	18.00	25.00
Capital outlay	8.99	21.99	16.55	3.33	7.61	12.80	5.89	4.47
Interest on debt	2.29	7.89	2.99	.27	1.19	2.02	1.94	1.00
Total expenditure for personal services	179.62	454.80	273.73	197.48	182.05	168.14	145.66	89.70
Gross debt outstanding	480.67	1,164.55	610.75	570.77	652.47	422.60	352.11	278.77
Long-term	411.05	863.38	545.49	514.51	543.42	374.80	315.07	263.12
Full faith and credit	234.93	569.38	384.40	275.30	308.15	211.27	186.09	115.06
Utility debt only	39.49	161.51	37.49	15.11	26.22	16.26	22.95	17.81
Nonguaranteed	176.38	294.00	161.09	239.21	235.27	163.53	128.98	148.10
Utility debt only	83.97	119.25	98.45	84.86	76.59	90.64	69.91	73.46
Short-term	69.61	301.17	65.26	56.26	109.05	47.80	37.04	15.64
Long-term debt issued	42.40	75.87	65.90	51.20	84.56	35.64	47.23	23.99
Long-term debt retired	26.94	68.38	29.18	27.10	39.49	23.51	23.21	15.31

Source: U.S. Department of Commerce, Bureau of the Census, "City Government Finance in 1974–75," table 4 (p. 8).

TABLE 3.—SUMMARY OF MUNICIPAL FINANCE ITEMS BY POPULATION-SIZE GROUPS: 1971-72

Item	All munici-palities	Municipalities with a 1970 population of—									
		1,000,000 or more	500,000 to 999,999	300,000 to 499,999	100,000 to 299,999	50,000 to 99,999	25,000 to 49,999	10,000 to 24,999	5,000 to 9,999	2,500 to 4,999	Less than 2,500
	Per capita amounts										
eneral revenue	265.65	620.50	387.08	296.00	261.57	202.42	185.79	143.75	120.14	106.38	91.40
Intergovernmental revenue	87.17	256.74	141.69	92.58	80.72	50.43	44.15	33.38	27.71	25.17	20.89
From State government	63.78	222.52	71.29	56.10	51.11	35.39	32.05	24.38	19.93	18.23	19.83
General revenue from own sources	177.49	363.76	245.40	203.46	180.86	152.01	141.67	110.36	92.41	81.28	70.51
Taxes	128.62	292.27	181.53	131.15	132.71	111.21	96.43	71.84	57.73	49.44	40.23
Property	82.70	158.15	107.25	82.31	98.55	84.08	72.01	48.87	39.39	33.83	30.72
Other	45.92	134.12	74.27	48.83	34.16	27.14	24.42	22.97	18.34	15.60	9.51
Charges and miscellaneous	43.86	71.49	63.87	72.31	48.15	40.79	45.25	38.52	34.68	31.85	30.28
Current charges	29.50	45.31	42.86	46.43	30.74	26.05	28.72	23.04	20.72	16.96	.61
Special assessments	3.46	1.97	3.16	3.30	3.72	4.20	4.84	4.93	3.46	2.94	.70
Sale of property	1.22	2.34	1.47	1.73	2.13	1.20	.74	.56	.65	.39	(Z)
Interest earnings	5.20	8.74	8.87	8.95	5.45	4.76	4.00	3.39	2.55	2.18	.44
Other and unallocable	9.48	13.14	7.51	11.91	6.11	4.59	6.95	6.61	7.29	9.38	28.52
eneral expenditure, all functions	271.47	636.38	398.26	296.37	271.66	211.78	188.41	143.92	123.69	114.10	91.92
Capital outlay	49.89	86.68	75.81	68.20	60.48	45.84	36.74	29.62	26.80	30.87	11.21
Other	221.58	549.70	322.37	228.18	211.15	165.94	151.68	114.31	96.85	83.21	80.70
Education	44.32	125.14	54.56	57.89	54.08	37.95	29.05	13.65	7.74	2.55	3.31
Capital outlay	5.29	14.28	8.38	4.40	6.97	5.15	2.75	1.81	.74	.33	.23
Other	39.04	110.92	46.18	53.62	47.11	32.80	26.30	11.84	6.99	2.22	3.08
Highways	21.21	19.10	26.98	20.65	22.52	21.67	20.15	20.41	19.88	20.49	19.67
Capital outlay	8.99	7.90	15.53	10.67	11.02	9.65	7.34	6.93	5.54	6.06	8.06
Other	12.21	11.02	11.45	9.98	11.50	12.02	12.81	13.48	14.34	14.43	11.61
Public welfare	22.95	120.43	38.07	6.18	6.45	2.94	2.12	.78	.39	.25	.34
Cash assistance payments	12.57	63.29	25.74	3.52	3.51	1.25	.84	.28	.11	.04	.01
Other	10.38	57.14	12.33	2.66	2.94	1.69	1.28	.50	.29	.21	.33

Hospitals	15.64	56.48	26.98	6.80	7.16	6.81	10.07	6.45	6.91	3.24	.04
Capital outlay	1.20	3.31	2.38	.34	.50	.82	.96	.84	.98	.10	----
Other	14.45	53.17	24.61	6.47	6.66	5.99	9.10	5.62	5.93	3.14	.04
Health	5.18	19.60	11.08	4.70	3.20	2.02	1.31	.87	.52	.39	.08
Police protection	30.01	64.57	42.49	31.31	28.10	23.61	21.75	19.82	17.75	16.34	12.20
Fire protection	16.77	27.00	22.92	22.07	21.83	18.75	16.16	11.34	6.81	5.30	1.28
Sewerage	14.90	16.03	18.83	17.85	17.56	13.65	15.10	14.65	15.36	14.64	2.24
Capital outlay	9.23	12.11	10.80	9.79	11.51	8.26	8.75	8.45	9.48	8.56	1.25
Other	5.66	3.91	8.03	8.06	6.05	5.38	6.35	6.20	5.88	6.08	.99
Sanitation other than sewerage	10.18	19.47	13.24	10.81	11.43	8.62	8.28	7.75	7.22	6.38	1.11
Parks and recreation	11.89	13.21	21.27	20.57	16.23	13.42	10.19	7.71	5.79	4.70	.87
Housing and urban renewal	11.28	31.81	18.60	11.99	16.48	8.64	4.85	2.13	1.89	1.14	----
Libraries	3.54	6.06	5.69	3.99	3.86	4.15	3.05	2.30	1.65	1.22	.25
Financial administration	4.34	5.82	6.64	4.39	4.68	4.39	3.93	3.58	3.32	3.05	1.60
General control	7.53	11.74	11.30	5.85	6.01	6.14	5.93	6.37	6.30	6.36	7.06
General public buildings	4.00	6.94	4.59	4.94	4.90	4.22	3.01	2.99	2.80	2.68	.37
Interest on general debt	11.62	24.73	15.29	15.54	11.99	8.39	8.44	6.49	6.06	6.58	6.27
Other general expenditure	36.11	68.25	59.67	50.83	25.14	26.42	25.02	16.64	13.26	18.75	35.23
Utility revenue	44.14	69.56	56.54	32.17	44.10	35.73	39.37	44.25	45.06	43.17	8.74
Utility expenditure	48.27	92.75	57.80	33.77	44.51	36.39	40.98	45.46	46.40	44.16	8.36
Debt outstanding	397.63	896.03	496.17	473.59	389.34	296.25	284.95	250.39	226.81	231.49	154.05
Long-term	347.13	713.94	444.69	429.84	328.49	266.60	266.19	238.14	214.64	223.26	147.42
Full faith and credit	209.70	490.38	296.82	266.36	201.49	153.48	133.78	107.07	90.38	81.55	124.72
Nonguaranteed	137.43	223.56	147.87	163.48	127.01	113.12	132.42	131.07	124.26	141.71	22.70

Source: U.S. Department of Commerce, Bureau of the Census, 1972 Census of Governments, Vol. 4, No. 4, "Finances of Municipalities and Township Governments," table 16 (p. 34).

Still more indicative are data for all local governments for population-size groups of county areas. Here the pattern is one of declining per capita expenditure with declining population, down to counties with population 10,000–24,999. But counties with less than 10,000 population show higher per capita spending than the average for those from 10,000 to 50,000 (table 4).

TABLE 4.—SELECTED ITEMS OF LOCAL GOVERNMENT FINANCES FOR POPULATION-SIZE GROUPS OF COUNTY AREAS, 1971-72

Item	Total	Population-size group (1970 population)					
		250,000 or more	100,000 to 249,999	50,000 to 99,999	25,000 to 49,999	10,000 to 24,999	Less than 10,000
	Per capita amounts						
General revenue, excluding interlocal	517.70	615.00	452.83	401.33	377.22	373.25	413.53
Intergovernmental revenue	195.27	220.82	172.34	165.48	162.60	164.16	161.79
From State government	172.88	189.93	155.23	152.28	151.91	155.76	153.11
From local sources	322.43	394.17	280.49	235.85	214.62	209.09	251.73
Taxes	244.66	309.59	208.62	165.55	143.98	141.99	184.83
Property	204.74	251.14	183.27	145.26	128.25	129.69	172.59
Other	39.91	58.45	25.35	20.29	15.72	12.30	12.24
Charges and miscellaneous	77.77	84.58	71.87	70.29	70.64	67.11	69.91
Direct general expenditure	523.90	622.61	467.31	404.76	377.69	371.60	399.67
Capital outlay	80.31	98.21	76.43	58.41	50.27	48.40	47.98
Other	443.59	524.41	390.88	346.35	327.41	323.20	351.69
Education	239.38	253.84	242.98	221.34	207.97	207.53	221.07
Other than capital outlay	214.42	227.13	216.01	198.18	187.63	187.81	202.03
Highways	30.87	28.34	28.85	30.05	34.05	40.75	55.71
Other than capital outlay	19.34	15.67	18.50	21.15	24.45	29.87	39.45
Public welfare	43.63	64.10	28.56	19.22	16.41	15.44	13.80
Hospitals	27.27	31.66	18.21	24.01	24.11	25.31	24.09
Other than capital outlay	24.71	29.03	16.17	20.89	21.55	22.91	21.84
Health	7.23	10.05	5.63	4.13	2.97	2.69	3.08
Police protection	25.12	35.41	17.61	13.63	11.51	9.59	10.06
Fire protection	12.69	17.89	10.75	7.52	4.84	2.61	1.78
Sewerage	16.03	20.34	17.93	11.77	7.58	4.68	2.89
Other than capital outlay	5.20	6.58	5.10	3.86	3.17	20.3	1.16
Sanitation other than sewerage	7.81	11.05	5.48	4.69	3.41	2.70	1.54
Parks and recreation	11.40	17.02	7.95	5.23	3.63	2.50	1.70
Natural resources	3.21	3.54	2.21	2.64	3.12	3.09	5.74
Housing and urban renewal	13.28	18.54	11.47	6.94	5.53	4.04	2.75
Correction	3.95	6.22	2.03	1.27	1.12	0.94	1.06
Libraries	3.70	4.97	3.19	2.33	1.71	1.53	1.30
Financial administration	6.29	7.08	5.87	5.00	4.86	5.29	7.05
General control	12.33	14.47	11.11	9.25	9.00	9.14	12.26
General public buildings	5.52	7.03	5.41	3.51	2.82	2.67	3.17
Interest on general debt	19.15	24.11	16.55	12.64	12.85	11.61	9.57
Other and unallocable	35.04	46.96	25.52	19.60	20.19	19.49	21.05
Water supply revenue	15.60	18.80	14.68	12.87	11.13	8.62	6.43
Water supply expenditure	18.40	21.65	17.93	15.89	13.32	10.72	8.86
General debt outstanding	484.60	608.64	428.18	330.44	317.27	278.35	242.32
Long-term	424.84	521.73	379.47	303.46	294.48	267.46	234.39
Local schools	159.57	173.35	168.39	147.74	132.19	118.31	109.99
Other	265.27	348.38	211.03	155.71	162.29	149.15	124.39

Source: U.S. Department of Commerce, Bureau of The Census, 1972 Census of Government, vol. 4 No. 5., "Compendium of Government Finances," table 51 (p. 201).

Since these county area data offer the greatest detail by population-size groups, and in addition cover all types of governments (county, municipal, township, school districts, and special districts), they deserve closer examination to see where smaller units of government spend their money and how their expenditures compare with larger units. Education, the largest single expenditure category, showed the same pattern as total direct general expenditure, with the low point occurring at 10–25,000 population, and counties with less than 10,000 inhabitants spending about the same on the average as those with 50–100,000. In highway spending the relationship between per capita expenditure and population size was strongly negative, the smallest counties spending almost twice as much per capita as the largest. Welfare expenditure showed exactly the opposite pattern, per capita spending by the least populous counties being lowest. These are the three largest expenditure categories. Most other functions also showed a pattern of declining expenditure with smaller populations. Per capita debt also was lowest among the 10,000 and under counties.

While local government revenues will be discussed later, it is worth noting that each of the three largest local expenditure categories—education, highways and welfare—are very heavily subsidized by Federal and/or State grants.

What explains the generally lower level of per capita expenditure in the smallest counties? The explanation is to be found largely in the lower rate of compensation paid to public employees in rural areas. For example, per capita local expenditures for education were 5 percent lower in the smallest counties than for all counties. However, average monthly earnings of school teachers in these counties were 26 percent lower than the all-counties average, while the number of teachers per 10,000 of population in the most rural counties was 20 percent *greater* than the average for all counties (table 5). Thus, for education at least, rural areas enjoy greater inputs per capita (and probably also per pupil) in terms of teacher-pupil ratios than more urban areas, but get by cheaper by paying them less.

TABLE 5.—EMPLOYMENT AND MONTHLY EARNINGS OF PUBLIC EMPLOYEES, BY POPULATION SIZE OF COUNTY AREA, 1972

Item	All areas	More than 250,000	100,000 to 249,999	50,000 to 99,999	25,000 to 49,999	10,000 to 24,999	Under 10,000
Full time equivalent employees per 10,000 of population—							
Education	182.9	174.6	190.2	188.1	190.1	197.1	214.8
Teachers only	123.7	117.4	128.2	128.9	129.8	134.3	147.5
Functions other than education	149.2	174.1	123.3	119.3	116.9	120.2	138.4
Average October earnings—							
Full-time employees:							
Teachers	$947	$1,083	$900	$822	$777	$733	$703
All other	686	795	616	548	511	479	468

Source: U.S. Department of Commerce, Bureau of the Census, 1972 Census of Governments. "Public Employment" (Vol. III, No. 2) p. 103.

Lower salaries, in fact, are evident across the board. Direct general expenditure of local governments for all functions other than education were 37 percent lower in the most rural counties than for all counties combined. Average salaries were 33 percent lower, while full-time employees per 10,000 of population were slightly below average, but the lower rate of compensation results in per capita expenditures significantly below the average.

These comparisons call into question the notion that local public services are undersupplied in rural areas or that rural areas have a smaller volume of local governmental activity. The number of people involved in delivering public services is roughly the same as for all other local areas (slightly greater in education, slightly less in all other functions combined), but these workers are paid significantly less than their urban counterparts. Does this difference reflect a difference in quality of inputs which is in turn reflected in the *quality* of public services received by rural people? This question I suggest, is one that needs further research.

Fiscal Resources

Like the term "public services need," the term "fiscal resources" implies a distinction that does not exist. A community's resources, after all, are not divided neatly between those available for private sector expenditure and those available for public services, except in an *ex post* sense. The fiscal resources of a community really consist of the total income of its members.

By this measure of fiscal capacity, rural areas appear to have about 20 percent less fiscal resources to draw on than urban areas, with areas dominated by rural nonfarm people (*e.g.*, small villages) considerably above those populated by farm people as shown in table 6.

Table 6.—*Median income of families and unrelated individuals by size of place, 1969*

Total	$9, 590
Urban, total	10, 169
Urbanized areas, total	10, 618
Central cities	9, 519
Urban fringe	11, 771
Places of 10,000 or more	8, 817
Places 2,500 to 10,000	8, 487
Rural, total	8, 071
Nonfarm	8, 248
Farm	7, 296

Source: U.S. Bureau of The Census, Census of Population: 1970, *General Social and Economic Characteristics*, Final Report PC (1)-C1 United States Summary, Table 105.

To think of personal income flows as an indication of the fiscal resources available for support of public services implicitly assumes that resources can be shifted from one sector to another with negligible friction. In reality, there are many barriers and institutional constraints to this shift. In fact, the fiscal problem derives to a large extent from barriers and rigidities that prevent local citizens from achieving the desired division of their available resources between public and private sector activities. Some of these problems are organizational in nature, some have to do with decisionmaking structures, and some reflect deficiencies in the fiscal structure.

Another measure of fiscal capacity is one that seeks to estimate the revenues that lie within the fiscal reach of the community, recognizing that not all local revenues come out of resident income; some local taxes reach the income, expenditure, or property of nonresidents. This conception of fiscal capacity points toward some such measure as that developed by The Advisory Commission on Intergovernmental Relations (1) using the yield of a representative tax system levied at standard rates. This method recognizes the dominance of the property tax at the local level and the fact that potential revenue from this tax may bear little relation to resident income, especially where absentee ownership is prevalent.

It seems likely that rual areas, those dominated by farming especially, would show greater fiscal capacity by this measure than by median family income. Data unfortunately do not permit a rigorous test, though a cursory check of Ohio counties does suggest that less populous counties have distinctly lower fiscal capacity (table 7).

TABLE 7.—MEDIAN REVENUE CAPACITY FROM LOCAL SOURCES, SELECTED OHIO COUNTIES BY POPULATION SIZE, 1966–67

Population size group	Number of counties	Median revenue capacity
500,000 to 999,999	4	116.5
150,000 to 499,999	3	109.0
200,000 to 249,999	11	100.0
50,000 to 99,999	23	97.0
30,000 to 49,999	4	83.0
Less than 30,000	1	85.0

Source: Advisory Commission in Intergovernmental Relations, "Measuring the Fiscal Capacity and Effort of State and Local Areas" (Rept. M–58), March 1971, table G–11.

REVENUES OF NONMETROPOLITAN COMMUNITIES

In terms of over-all revenues, (*i.e.*, local general revenue from all sources except interlocal transfers), the pattern among local areas by population-size group is, not surprisingly, very similar to that of overall general expenditure shown in table 7. Per capita revenues decline consistently with lower county population, except for the very smallest category (less than 10,000). This pattern is found with minor exceptions in each of the major categories of general revenue.

In terms of composition of revenues, the smallest areas do not deviate greatly from the pattern of all local governments. Property taxes—the largest single source of revenue for local areas of all sizes—are only slightly more significant in budgets of rural communities. Nonproperty tax revenues, however, are distinctly less important for small communities. User charges and miscellaneous revenue sources are slightly more important and State aid is significantly more important to local governments in counties with fewer than 10,000 inhabitants than for all local units.

The data for municipalities (table 3) show a continuous decline in per capita revenues with decreasing city size. In 1971–72, municipalities with population below 2,500 raised only about one-third as much per capita as the average for all cities. Property taxes generated a slightly larger share of small-town revenue and nonproperty taxes a much smaller share, as compared to cities of all sizes. State aid also represented a smaller share of revenue for small towns. Charges and miscellaneous general revenues were a much larger percentage, accounting for one-third of all general revenue.

The greater detail provided in census data for municipalities as compared with all local units reveals that current charges, which incidentally is the largest component of "charges and miscellaneous," are almost negligible as a revenue component for the very smallest villages. The bulk of the "charges and miscellaneous" general revenue came from the mysterious category "other and unallocable," which in per capita terms was three times the average for all cities. Possibly small places receive substantial sums in such things or gifts and bequests. Perhaps it is common for the local service club, for example, to donate money to support some civic function. More likely, in my opinion, there exist major deficiencies in data reported by small communities that cause items to be classed "other and unallocable."

While per capita property taxes appear to be substantially lower in small communities and rural areas than in more highly urbanized areas, the value of taxable property appears to be lower as well. In 1971, per capita net assessed value of taxable property outside SMSA's averaged 18 percent lower than inside SMSA's. Moreover, the disparity has been increasing; in 1961 the gap was only 11 percent. Whether effective rates are lower on the average in more rural areas cannot be said with certainty, although, a glance at data for Ohio suggests that this is the case (table 8).

TABLE 8.—AVERAGE EFFECTIVE PROPERTY TAX RATES, OHIO COUNTIES, BY POPULATION SIZE, 1973

County population size	Number of counties	Median county rate (percent)
More than 500,000	5	1.71
250,000 to 499,999	4	1.36
100,000 to 249,999	13	1.26
50,000 to 99,999	24	1.15
30,000 to 49,999	21	1.08
20,000 to 29,999	17	.96
Less than 20,000	4	1.06

Source: Calculated from data reported in Ohio Board of Tax Appeals, "1973 Average Tax Rates" (mimeo), and "Ohi Department of Taxation Annual Report—1974," pp. 96–97.

It would appear that the resources of rural areas and small towns are generally adequate to support existing or expanded public services, should the citizens desire, without danger of getting out of line with fiscal burdens borne by their cousins in the city. To the extent rural communities face a problem in financing public services, it appears to lie in obstacles that are encountered in transferring resources from private to public use—legal or constitutional obstacles, administrative problems, obstacles in terms of undesirable economic effects or in terms of perceived inequities in the readily available revenue sources. I shall consider each of the major local tax sources in turn, noting for each what appear to me to be the problems and constraints on revenues obtainable from that source, along with possible research needs.

The Property Tax

Perhaps the most important constraint on local revenues is the fact that rural governments are almost exlusively dependent on the property tax for tax revenue and the property tax, deservedly or not, has a bad reputation. Across the nation, in urban areas as well as in rural, tax structure reform is often seen as meaning simply deemphasizing the "tired, outmoded, unfair property tax" and replacing it with something else, even in relatively low tax areas. Probably no cause is more popular among local and State officials than "property tax relief."

There are, of course, plenty of things wrong with the property tax, some of them inherent in this form of tax (its selective application, its *ad rem* character) and some correctible through improved administration. And there are no doubt local areas, rural as well as urban, in which property taxes are really too high.

On the whole, however, it seems to me the criticisms of the property tax have been overdone. At the very time when scholars and professional tax policy analysts are beginning to think the property tax is not so bad after all, public officials are finally catching up with and starting to act on the recommendations of past decades that the property tax be reduced, repealed, or gutted. Today it is common to hear opinion leaders in rural areas, even where property taxes are comparatively low, express the conviction that while increased local revenues are unquestionably desired, the only available source is that "worst of all taxes," the property tax, and so the community clearly and obviously must get along without additional revenue.

The assault on the property tax has also led to a flood of property tax relief measures, many of them of very dubious merit. Circuit breakers are perhaps the least objectionable of these, as they ordinarily protect the local community from revenue loss and are somewhat discriminating in targeting of property tax relief. Nevertheless, circuit breakers can be criticized for encouraging over-consumption of housing by the elderly and for enriching heirs rather than elderly homeowners who presumably are the target beneficiaries.

Nonmetropolitan communities are affected fiscally by another misguided tax relief measure in the form of preferential assessment of land use in agriculture. The deficiencies of this policy are well known, in terms both of land use consequences and of tax equity. Less clear, to me at least, is the factual question of the extent to which local communities have borne the cost through lost revenues, and what the pattern of these revenue losses may be. One would perhaps expect revenue losses to be confined to the periphery of fairly large metropolitan areas. But the increasing popularity of rural areas for both residential and industrial sites may be causing urban land uses and values to extend far out into the country. I suggest that we need to know more than we do about who gains and who loses from preferential assessment of farmland. We need also to know more about how preferential assessment affects State assessment equalization calculations and distributions of intergovernmental aids. And we need to consider more carefully the question of whether local communities or the State should bear the revenue loss.

Most objectionable of all in my opinion are such crude property tax relief measures as assessment freezes, designed to insulate the property owner from the tax consequences of rising property values, or rate rollbacks, which seek to accomplish the same thing through rate adjustments. These increasingly popular gimmicks take virtually all the elasticity out of the property tax. They can create a serious fiscal bind for nonmetropolitan communities, which as we have seen are especially dependent on the property tax. And they stir up pressures for opening up more nonproperty tax sources to local governments, a course of action that entails many problems of its own.

The policy posture suggested by this line of thinking is that of rehabilitating the property tax in citizens' thinking as a respectable and essential component of State-local fiscal systems, with an especially important role to play in nonmetropolitan communities. It is important to the rehabilitation of the property tax that citizens and policy makers, as well as researchers, better understand the true workings of the tax.

I am not referring not only to the "revisionist" thinking which holds that the incidence of the tax is largely on property owners rather than on occupants and that its incidence is probably progressive rather than regressive, More particularly I am suggesting the need for a better understanding of the *exportability* of local property taxes. In rural areas where nonresident land ownership is prevalent (perhaps increasingly so), and in rural communities with an industrial or mining tax base, nonresidents probably bear a significant share of the property tax. When communities tax a partly nonresident owned base, they in effect receive a matching grant from the rest of the world. The significance of this phenomenon to local fiscal policy, and to State and national policy, seems to be insufficiently appreciated.

The patterns of interlocal transfers and subsidies through tax exporting raises questions of equity as well as of incentives to over-or under spending. Timothy P. Ryan, in a dissertation now nearing completion at The Ohio State University, is exploring the effect of the tax export phenomenon on State-local revenue structures, using highly aggregative data and a national perspective. Research on a more micro level looking at the pattern of land ownership in rural areas might illuminate the extent and direction of tax exporting and thereby contribute to a better understanding of the merits and weaknesses of the property tax. I suspect the results would show significant advantages to many rural areas in using the property tax more intensively.

Nonproperty Taxes

Rural people, farmers in particular, have always viewed the property tax as particularly inimical to their interests. Local nonproperty taxes tend to be viewed more favorably, no doubt because of the opportunity they afford to reach those who live in the country, perhaps owning little property, while making big incomes in the city. Yet, as the data on local revenue patterns reveal, nonproperty taxes have not become a significant revenue source to small nonmetropolitan communities. In other words, there apparently are barriers to their widespread use by rural areas.

What are these barriers and how might they be overcome? What can local nonproperty taxes contribute to the fiscal resources of such local areas? Local sales and income taxes are the only ones that have significant general fund revenue potential. Local motor vehicle licenses also deserve attention, though their revenue ordinarily is earmarked for roads.

Income Taxes.—In 10 States local governments make use of the income tax, though only in two, Ohio and Pennsylvania, are they levied by small units. According to a 1974 ACIR report (2), income taxes are in effect in 335 Ohio municipalities and in 3,765 Pennsylvania communities, more than 1,000 of which are school districts.

Local use of income taxes has been governed to a large extent by administrative constraints. Local income taxes usually take one of two forms. Most common are flat rate taxes on earned income, locally collected, largely through withholding. A few are surcharges on the State tax (or an additional levy on the State base), State administered and returned to the local government of the taxpayer's residence. Either form presents problems for rural communities.

The earned income tax depends for its success on the existence of a sizable amount of wage and salary employment that can be subjected to withholding. Lacking access to Federal income tax information, local governments have difficulty enforcing an earnings tax on those not subject to payroll withholding. This limitation rules out this form of tax for many rural communities, though the Ohio and Pennsylvania jurisdictions have apparently achieved some success. Criticisms focus also on the compliance problems faced by businesses that are required to withhold taxes from employees' earnings, and problems in allocating corporate income among taxing municipalities, as in Ohio.

(Some years ago, while studying income tax administration in small localities, I was impressed to discover that some villages apparently enjoyed very effective enforcement by virtue of having an administrator who made it his or her business to know everyone in town, where they worked and the approximate amount of their earnings. Failure to report, or underreporting, was said to be almost nonexistent.)

The other form of local income tax relies on a piggy-back arrangement with the State. This form is far simpler from an operational standpoint, imposing little if any added administrative burden on local officials. However, this method almost of necessity involves returning the revenue to the taxpayer's community of residence rather than to that of employment. Most places this perhaps creates no obvious problem and in fact would benefit most rural communities. But in urban areas its effect is to enrich relatively wealthy suburbs and to do little for hard-pressed central cities. Its over-all effect, in other words, tends to be fiscally disequalizing. This tendency can be minimized by making the country rather than some smaller class of local government the tax levying unit. In such a form, the local income tax appears to have genuine potential as a fiscal resource for rural areas.

All Maryland counties and many counties of Indiana now avail themselves of this form of piggy-back local income tax. I know of no studies of the effect these taxes have had on the fiscal condition and services of rural counties, or the nature of any redistribution of the tax load. Such studies would be useful in evaluating the potential for such taxes in rural areas.

Sales taxes.—More than half the States allow local units to impose retail sales taxes. In almost all the tax is piggybacked on the State levy. This administrative arrangement makes the tax feasible for even very small communities. Local sales tax are in effect in 380 California municipalities and 58 counties; in 1,245 Illinois municipalities and 100 counties; and in 757 Texas municipalities (2, p. 36).

When used by municipalities, the effect of the local sales tax is to suck revenue out of the surrounding area into retail trade centers. Small isolated communities can no doubt employ such a tax advantageously; but where urban centers dominate retail trade, rural areas have nothing to gain and much to lose from local sales taxes. For this same reason, county sales taxes are clearly preferable from a rural standpoint to municipally imposed taxes. Again, research appears to be needed on the fiscal and tax burden redistribution effects of local sales taxes.

Motor Vehicle Licenses.—Among the countless other sources of local revenue, one that deserves mention is the local motor vehicle license. Ohio is among the States that permit counties and municipalities to impose such a charge. The local fee is collected along with the State registration fee, so administrative problems are negligible. As the revenue is typically earmarked for highway use, there is no help here for general fund problems. However, with rising costs of highway maintenance and improvements and the low elasticity of the gas tax, additional highway revenues are often needed. Local motor vehicle registration fees offer a plausible and potentially productive source of such revenue.

Conclusion

Rural communities are being faced with the necessity to develop governmental responses to new problems brought on by many kinds of social and economic developments—changing population patterns, changing norms and expectations regarding public services, and changing technology of service delivery, to mention just a few. The effect is to call forth additional governmental activity and to put increased strain on existing revenue sources.

Better understanding in several areas is essential if rural communities are to cope with these new demands. It is remarkable how little we know about the nature and origins of the demand or "need" for public services at the local level. First, I believe we need to think through the question, "what is a public service need?" and how can the concept be operationalized? What gives rise to public service needs? With some imagination, one perhaps can visualize the development of rigorous definitions and measurements with which to formulate and test relationships that will in turn enable us to predict the emergence of public service needs in consequence of certain conditions or trends, or to control needs by manipulation of certain control variables.

Maybe I am too pessimistic in believing that this sort of modeling of the demand for public services remains in the distant future. Conceptual difficulties as well as data limitations are formidable. The few studies that I know of that have tried to develop empirical demand functions for local public services have done little more than scratch the surface, despite the great ingenuity and dazzling brilliance of the theoretical and statistical tools.

While further efforts along this line certainly deserve encouragement, I suspect that we are still in a stage where less rigorous but possibly heuristic research of the case study variety would yield valuable insights. Useful results might flow from additional studies of the connection between such causal variables as population growth, changing age composition of population, changing employment patterns, influx of industry of various kinds, or changing transportation routes, and such dependent variables as demand or needs (however measured) for schools, social services, police protection, and the like. Attention might well be focused systematically on methods of averting conditions that give rise to a need or demand for public activity—that is for, dealing with the problem before it arises.

On the revenue side I think there is interesting and useful research to be done on the pattern of incidence of various kinds of local taxes—not incidence in the sense of whether taxes are progressive or regressive nor in the sense of whether burdens fall on factor owners or on consumers, but rather the geographic pattern of incidence. Unless I am mistaken, the typical rural community has a substantial and growing opportunity for exporting part of its governmental cost to the rest of the world. It would be useful to know the extent to which this is true for each of the major potential sources of locally raised revenue, and the conditions that favor tax exporting. A separate but equally interesting policy issue concerns the question whether and how national or State policies should encourage or discourage such exporting.

More mundane but equally important is the need for continued attention to possible ways to simplify and improve administration of local taxes, both on property and on such other bases as income or retail sales. Difficulties of small scale administration are a significant constraint on use of the major nonproperty taxes. Innovative methods of administration, including extension of the piggyback principle, could open up new revenue potential in many areas. Coordinate attention should of course be given to the potential effect of nonproperty tax revenues on interlocal fiscal disparities.

The agenda for administrative reform in property taxation is well known. To this standard agenda I would suggest adding the topic of contract assessment and would urge that research be directed to the question whether private appraisal firms can do a better job of assessment in rural areas than the assessor himself and his own staff. This issue is perhaps best considered in context of the larger issue of contracting by small units for private delivery of public services in general.

Finally, strengthening fiscal resources and public service delivery systems in rural areas definitely requires a fresh look at the division of functional responsibilities between the State and its local subdivisions and between the States and the Federal government. Mechanisms for joint financing also deserve continued study and critical appraisal. These however are topics that are best left to other program participants.

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NON-TAX FINANCING AND SUPPORT FOR "COMMUNITY" SERVICES: SOME POLICY IMPLICATIONS FOR NON-METROPOLITAN GOVERNMENTS[1]

[By Fred J. Hitzhusen[*]]

INTRODUCTION

The increasing importance of non-tax revenues for financing local government or community services has generated considerable interest in recent years (22). Various user charges are the dominant type of non-tax financing. Proponents generally cite the desirable linkage between individual payment and benefit as the primary advantage of this revenue source (13). In addition to user charges, donations, a variety of fund-raising activities, and volunteer effort provide non-tax revenue and support for a wide range of community services.

Despite the variety and complexity of non-tax sources of financing and support, some clear trends and policy implications could emerge through agreement on a universal definition of community services. Such is not the case. What may be a community or local government service in one situation may be privately provided in another and vice versa. This phenomena is particularly evident when one contrasts rural and urban or nonmetropolitan and metropolitan communities.[2]

The long established community service nature of services such as water supply and sewage treatment and disposal in the urban municipality has little relevance to the rural township. Homeowners in the latter case usually drill their own wells and construct and maintain their own septic tanks. Even within more universally defined community services such as fire protection and emergency ambulance service, wide variations exist in financing and support. The rural volunteer fire department with its social club overtones and accompanying assortment of donations and fund raising activities is in sharp contrast with the tax financed, fully-paid urban fire department.

These differences in the definition, funding, and support of community services would be primarily of sociological significance in the absence of numerous intergovernmental initiatives for sharing revenues. Implicit in most intergovernmental transfers such as Federal revenue sharing is the necessity to establish some measure(s) of relative capacity or effort on the part of the lower level recipient govern-

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[1] Helpful comments on this paper have been received from Professors Frederick Stocker and Leroy Hushak.

[2] For purposes of this paper, communities will refer to all types of local governments. Rural communities or local governments are those with less than 2,500 population. Some rural local governments are located within counties that are part of a Standard Metropolitan Statistical Area (SMSA). Nonmetropolitan local governments are those within counties that are not part of an SMSA.

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ments.[3] For example, financial or tax effort is generally defined as the sum of public revenues obtained from a government's own sources expressed per $1000 of personal income (13).

The primary point of contention arises over what is counted as revenue in the numerator of this fiscal effort ratio. Historically, primarily to maintain "cleaner" distinctions between public and private activity, tax revenues have been included and most forms of non-tax revenues and support excluded from measures of financial or fiscal effort. What follows is an attempt to assess first the various sources of non-tax revenue and support and next to determine their respective significance in the measurement of tax effort for Federal revenue sharing allocations to rural and/or nonmetropolitan local governments.

NON-TAX REVENUES AND SUPPORT

User Charges

Since World War II, State and local collection of user charges has been growing relative to total general revenues. Such charges provided 12.9 percent of general revenues collected by local governments from their own revenue sources in 1953, 16.3 percent in 1963 and 24.1 percent in 1971–72. For State governments, the corresponding figures for the first two time periods are 6.7 and 9.6 percent respectively (13, 23). User charge revenues collected by local governments in 1972 came predominately from hospitals (29.0 percent) and education (23.2 percent), followed by sewerage (11.2 percent), housing and urban renewal (5.5 percent), air transportation (5.4 percent), sanitation (3.6 percent), local parks and recreation (3.2 percent), water transport and terminals (2.1 percent) and 1.8 percent from parking facilities (23).

Hidden in the general growth trend of user charges is some evidence that rural and/or nonmetropolitan government provision of services is generally more dependent on the user charge. For example, charges and miscellaneous revenues [4] as a percent of total revenue from own revenue sources in 1971–72, represent 43.0 percent for U.S. municipalities under 2,500 and 27.1 percent for municipalities over 2,500 population. Utility revenues are not counted as revenues from own sources but were equal to 12.4 percent of revenue from own sources for municipalities under 2,500 and 25.2 percent for municipalities over 2,500 population in 1971–72 (24). When one sums charges and miscellaneous revenues, and water supply revenues for U.S. county area local governments over 25,000 and under 25,000 population they equal 28.5 percent and 34.3 percent respectively of revenue from own sources (23).[5] In addition, it would appear that private provision of user charge financed services is a much more common phenomena in rural and/or nonmetropolitan communities than in their urban or metropolitan counterparts. A prime example is the collection and disposal of solid waste. Unfortunately, no systematic data series are available for documentation and policy analysis.

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[3] Fiscal capacity measures are concerned with the ability of governments to obtain resources for public purposes, i.e., their potential for generating public revenues. Measures of fiscal effort try to gauge how much of this capacity they are actually using, i.e., how far are they reaching (14, p. 4).

[4] Includes current charges, special assessments, interest earnings, fines and forfeits, sale of property and other and unallocable revenues (22).

[5] The importance of user charges to State and local government varies considerably between States. For example, in 1972, user charges as a percent of own sources of revenue for State and local government were 7.5 percent in Connection and 20.2 percent in Oklahoma (22, p. 402).

Donations and Special Events

No data series exist on donations and the wide range of special event fund-raising forms of non-tax support for community services. These sources of revenue are most often associated with services such as fire protection, emergency ambulance, medical clinics, and hospitals in smaller communities. Preliminary evidence from a sample of 32 volunteer emergency ambulance services in rural Ohio shows the sum of donations and special fund raising events to average 22 percent of total revenues from own sources. The range is from zero to 70.2 percent (10).

Recent econometric work on the price and income elasticities of charitable giving shows price elasticities much larger than those that have been accepted previously.[6] Most of these results indicate price elasticity in excess of unity which suggests that charitable organizations gain absolutely more than the Treasury loses in revenue, i.e., the deduction is more than fully efficient (4). Donations to most nonprofit volunteer organizations, including fire departments and emergency ambulance services, qualify as charitable and are deductible (11).

The primary import of these findings is twofold. First, donations may be a much more significant source of non-tax revenue than is generally assumed. Second, donations could be a much more significant form of non-tax support if more community services qualified as charitable organizations.

Volunteer Effort

Voluntarism is a growing phenomenon and is increasingly recognized as an important form of non-tax support for various community services in the United States. Data sources and reliability are limited, but a Census Bureau survey indicates approximately 37,000,000 volunteers over age 13 in 1974 (3). Estimates of the annual economic value of total volunteer effort range from $12 to $50 billion (20, 25). Specific to community services, there are about one million volunteer firemen (five times the number of paid firemen) in the United States (2). One estimate places the economic value of volunteer firemen's effort at $4.5 billion annually (2).

Precise data are not available, but it would appear that voluntarism related to community services is predominately a phenomenon of small rather than large communities (9). For example, even though per capita expenditure comparisons are void of qualitative controls, they provide some evidence. Census of Government data for 1971–72 show fire department per capita expenditures of $1.28 for municipalities under 2,500 and $18 for municipalities over 2,500 population (24). Since salaries comprise approximately 85 percent of the average paid fire department's total budget, these data appear supportive of voluntarism (at least with respect to fire protection) as predominately a small place phenomenon. Similar findings might be expected relative to emergency ambulance,[7] libraries, and other services.

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[6] Refers to the deductibility of charitable contributions in the income and estate taxes. For those persons itemizing deductions, deductibility lowers the cost of giving to $1-r$, where r is the marginal tax rate. The efficiency of a tax deduction is usually the ratio of the induced increase in a particular activity due to the deduction to the revenue foregone by the Treasury. The size of the ratio is a function of the elasticity of demand for the good or service in question (4, p. 103).

[7] A study of Perlstadt found most of the volunteer emergency ambulance services in Michigan in communities of less than 8,000 population. The mean was 2,500 and the median 1,000 (19).

Considerable disagreement exists over the factors explaining voluntarism. The earlier mentioned Census Bureau survey ranked respondents' reasons for doing their first non-religious volunteer work as follows: (1) wanted to help people, (2) enjoyed volunteer work, (3) had a sense of duty, (4) had a child in the program, (5) could not refuse when asked, (6) had nothing else to do, and (7) hoped it would lead to a paying job (3). Stam and Stinson suggest that for many governmental type services provided by volunteers, the chief source of utility for the individual may be the tax savings resulting from his or her volunteer labor (21).

The Stam and Stinson hypothesis suggests that homeowners and owners of local businesses and commercial establishments are much more likely to become volunteer firemen. The authors state that casual examination of local volunteer fire department rosters seems to confirm this hypothesis (21, p. 56). Preliminary analysis from the study of volunteer emergency ambulance service in rural Ohio is much less conclusive relative to the socioeconomic characteristics of emergency squad volunteers. Seventy-eight percent were men; 80 percent were married; 95 percent were at least high school graduates; average age was 35 years; 69 percent had children at home; and laborers, operatives, craftsmen, and foremen were the most common occupational types (10).

Whatever the reasons, voluntarism even as simply a substitute for paid labor appears to be an important source of non-tax support for community services, particularly in rural and/or nonmetropolitan communities. Pending bills in the U.S. House of Representatives changing income tax deductions—child care costs for volunteers (H.R. 1980), increasing the 7-cents-per-mile automobile mileage deduction (H.R. 4558), and deductions or credits for volunteer time (H.R. 10611 and H.R. 5765)—combined with the earlier findings on price elasticities for charitable deductions suggest increased interest in and support for voluntarism (4, 17).

FEDERAL REVENUE SHARING

Allocation Formulas

Under the original and recently renewed Federal Revenue Sharing Act, Federal funds are allocated in the following manner: first, the funds are allocated among the States according to either a three- or five-factor formula, with each state allowed to pick the most advantageous formula. Under the three-factor formula, a State's share depends on its population, relative income per capita, and relative tax effort. The five-factor formula adds the State's urban population and relative State income tax collections. One-third of each State's allocation is then retained by the State with two-thirds passing through to local governments by county area (9, 21).

The next step is to divide each county geographic area allocation into three possible parts. An Indian tribe allocation is determined based on their proportion of the county population. A township and county government allocation is then determined on the basis of the ratio of all township and county government adjusted taxes (excluding taxes for education, special districts, and user charges) to the total adjusted taxes in the county area. The remaining proportion is allocated to the city and village units of government.

County, township, city, and village local government units receive their respective allocations on the basis of the same formula used to determine the county geographic area allocation, *i.e.*, population × tax effort × relative income. The same upper (above 145 percent), and lower (below 20 percent) adjustments provided for county geographic areas are also applied to the county, townships, and municipal units of government within each county geographic area. One exception is that any local unit of government receiving less than 20 percent of the average per capita local share for the State may have the allocation increased to the lower of either the 20 percent level or 50 percent of its adjusted taxes and intergovernmental transfers. Finally, if any allocation is less than $200, or any unit of local government waives its entitlement, that amount is allocated to the county government. Appendix 1 presents a more detailed description of the allocation process within a county area.

Sources of Allocation Bias

Several previous analyses have been concerned with various sources of bias in the allocation of Federal revenue sharing funds (1, 9, 12, 16). Nathan and Associates concluded that the 145 percent "ceiling" unfairly penalizes larger cities that otherwise would receive larger amounts because they have sizable populations of low income residents. They also criticized the requirement that a local government cannot receive less than 20 percent of the average per capita payments to other governments in its State because it tends to "shore up" small townships whose main responsibility is maintaining local roads (16). Others have suggested that the use of money income in the allocation formulas may favor rural areas to the extent that it disproportionately understates real income in rural areas.

Counter arguments could be made via the urban population weighting in the five-factor formula and the fact that many communities receive less than the 20 percent "floor" due to the 50 percent clause. The latter refers to 50 percent of a local government's adjusted taxes and intergovernmental transfers and if this amount is less than that determined by the 20 percent rule, the lower amount becomes the actual allocation.[8] Much more significant sources of bias than the foregoing appear to exist as the result of the inclusion and measurement of tax effort (particularly the tax element) in Federal Revenue Sharing. This is the primary remaining focus of the rest of the discussion.

Bradford and Oates state that some measure of tax effort is included in Federal Revenue Sharing primarily to provide a stimulus to the output of public services (5). Heller and other proponents have argued that decentralized levels of government compete to attract both new residents and business and are reluctant to raise tax rates for fear of discouraging potential entrants. The outcome is purported to be less than efficient levels of provision of public services in these jurisdictions (8). Some have challenged the validity of this argument and others have suggested eliminating tax effort as a criterion,[9] but tax effort continues to be an important component of the formulas for allocating Federal revenue sharing funds.

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[8] The 145 percent ceiling is significant for a few large cities such as St. Louis, Philadelphia, Richmond, and Hartford (16). Ohio data for Entitlement Periods 1 and 2 show that 24 villages, 5 townships and 6 cities were affected by the 145 percent maximum. For the same 12 month period, 765 townships; 263 villages and 20 cities were affected by one of the two minimums. Non-money income is probably relatively more important in rural and/or nonmetropolitan areas by may not be very significant relative to formula bias. For example, non-money income was about 3.5 percent of total U.S. personal income of farm population from all sources in 1975 (6).

General tax effort at the local level is defined as the ratio of adjusted taxes to aggregate income of county, township, or municipal governments. Adjusted taxes are all those general purpose taxes enacted or collected by the unit of government during its fiscal year. Taxes enacted for schools or other educational purposes and special districts as well as receipts from user charges, special assessments, interest earnings, or fines are excluded. Aggregated income for any local government unit means total money income as defined by the Bureau of the Census in the 1970 Census of Population and Housing (9).

Higher tax effort is intended to result in larger revenue sharing allocations. However, tax effort at the local level excludes taxes for education and special districts and user charges for services such as water supply, sewage, and waste disposal. It also excludes the services of volunteers such as firemen and hospital workers. To the extent that rural and/or nonmetropolitan communities raise disproportionate taxes for schools and special districts, and/or disproportionately substitute user charges for general revenue financing and volunteer for paid effort, their "tax effort" and thus their revenue sharing payment is decreased relative to urban or metropolitan communities.

Limited empirical work has been completed on alternative measures of tax effort (particularly the adjusted taxes element) as they relate to Federal revenue sharing allocations. A major analysis of adjusted taxes were conducted by the U.S. Comptroller General's Office in 1975, but no comparisons were made between rural and urban or metropolitan and nonmetropolitan communities (1). Hitzhusen attempted some estimates of the importance of user charge omissions based on preliminary 1974 data for Ohio (9). Lederer and Badenhop evaluated three alternative ways of including a value for volunteer firemen's effort as part of tax effort for Cumberland County, Tennessee. The resulting increase in Federal revenue sharing entitlement to Cumberland County ranged from 11 to 27 percent. This represents an allocation that changed from $19.76 to $25.13 on a per capita basis (12).

Allocation Findings for Ohio

Table 1 summarizes the 1972–76 Federal revenue sharing allocation to Ohio local governments by type of local government. It shows that per capita allocations to cities are approximately double the per capita allocations to villages and triple the per capita allocations to townships and counties. The same local government allocation formulas apply in all States, thus the allocation findings for Ohio should be reasonably representative of other States.

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[9] This argument is usually based on the notion that frugal communities are penalized for keeping taxes low.

TABLE 1.—FEDERAL REVENUE SHARING PAYMENTS TO OHIO LOCAL GOVERNMENTS, 1972-76

Unit of government	Population [1] 1973	FRS payments 1972 through June 1976 Total (millions)	FRS payments 1972 through June 1976 Per capita	FRS payments, fiscal year 1976 Total (millions)	FRS payments, fiscal year 1976 Per capita
County	10, 743, 371	$171. 6	$15. 97	$55. 6	$5. 18
Township	3, 251, 954	52. 6	16. 17	16. 6	5. 10
City	6, 613, 398	298. 4	45. 12	94. 6	14. 31
Village	878, 019	19. 6	22. 32	6. 3	7. 18
Total		542. 2		173. 1	

[1] Based on estimates for 1973. The sum of individual county population estimates is equal to the State population estimates. Township population is defined as the difference between individual county population and the sum of the city and village population estimates within each county. In Ohio, cities are municipalities over 5,000 population and villages municipalities under 5,000 population.

Sources: (18, 25).

Assessing the precise formula sources of these differences is dependent on a detailed data base and substantial computation. However, it is clear that county, township, and smaller municipal governments in Ohio have not fared as well as larger municipalities in Federal revenue sharing allocations. The empirical challenge is to determine the significance of omitting various forms of non-tax revenue and support from the measure of tax effort for Federal revenue sharing.

Preliminary Empirical Estimates of Bias

The limited empirical evidence on several types of allocation bias was reviewed earlier and additional analysis of non-tax revenue and support omissions from tax effort is proceeding. In lieu of more detailed analysis, some preliminary estimates are possible and may be illustrative of the potential significance of alternative sources of bias.

Census of Government data for 1971–72 on charges and miscellaneous, and water supply revenues in relation to own tax revenue sources provides a starting point. These data are presented in table 2 for U.S. county area local governments over 25,000 and under 25,000 population. When the sum of charges and miscellaneous and water supply revenues is added to the measure of tax revenues from own sources, it represents an increase of 37.4 percent in this measure for the above 25,000 and a 49.4 percent increase for the below 25,000 county area local governments.

TABLE 2.—*Local tax and nontax revenue*

Type of support	*Millions*
1. U.S. county area local governments over 25,000 (n=1246):	
Revenue from own sources	$60, 805
Taxes	(46, 448)
Charges and miscellaneous	(14, 357)
Water supply revenue	2, 996
Total	63, 801
2. U.S. county area local governments under 25,000 (n=1872):	
Revenue from own sources	4, 743
Taxes	(3, 291)
Charges and miscellaneous	(1, 452)
Water supply revenue	176
Total	4, 919

Source: (23).

The measure of taxes in table 2 includes taxes for schools and special district activities which are excluded from the "adjusted taxes" measure for Federal revenue sharing. The school and special district omissions appear to introduce further bias against nonmetropolitan areas. For example, nonmetropolitan areas had 22 percent of the U.S. population and generated 27 percent of the special district revenues in 1970 (27). Data for Ohio show that local taxes collected for schools in 1969 represented 46.1 percent of total local taxes in SMSA counties and 54.9 percent in non-SMSA counties (28).

Comparable aggregate estimates of "tax equivalent" values for various types of volunteer effort are not possible. However, the work by Lederer and Badenhop on the value of volunteer firemen in Cumberland County, Tennessee, is a start (12). Table 3 combines their three estimates of voluntary effort tax equivalents (VETE)[10] with secondary data from the U.S. Census of Government and compares the latter to data for all county area local governments in 1971–72.

TABLE 3.—*Local tax, nontax revenue, and tax equivalent support*

Type of support	
1. Cumberland County, Tenn.:	*Thousands*
Revenue from own sources	$2, 771
Taxes	(1, 509)
Charges and miscellaneous	(1, 262)
Water supply revenue	221
Total	2, 992
VETE:	
AH 1	93. 8
AH 2	(187. 5)
AH 3	217. 5
Total	3, 179. 5
2. All U.S. County Area Local Governments (n=3118):	*Millions*
Revenue from own sources	65, 548
Taxes	(49, 739)
Charges and miscellaneous	(15, 809)
Water supply revenue	3, 172
Total	68, 720

Source: (12, 23).

Despite the earlier discussed limitations of the tax measure in tables 2 and 3, adding charges and miscellaneous and water supply revenue to the measure of local taxes increases the measure of taxes by 98.3 percent for Cumberland County, Tennessee, and by an average of 38.2 percent for all U.S. county area local governments. If the middle estimate of volunteer firemen's effort is added to the measure of taxes for Cumberland County, this measure increases by 12.4 percent.

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[10] Three alternative dollar values (Voluntary Effort Tax Equivalents) based upon specific levels of professional equivalency and replacement cost were estimated. Alternative 1 assumes four and Alternative 2 assumes two active volunteers equal to one paid fireman. Alternative 3 is based on replacement value of the volunteer effort (12, p. 3).

One must keep in mind that with no increase in the total Federal revenue sharing allocation, one government can increase only at the expense of another. However, the foregoing evidence suggests that the omission of various user charges, schools, special districts and volunteer effort from measures of adjusted taxes for Federal revenue sharing allocations, penalizes nonmetropolitan local governments relative to metropolitan governments. If these forms of effort were included, it would appear that nonmetropolitan governments would make substantial relative gains in Federal revenue sharing allocations.

Virtually no systematic data series exist to evaluate the magnitude and tax equivalent significance of donations to and various fund raising activities for community services such as fire protection, emergency ambulance, medical clinics, and hospitals. The same is true for the commercially provided, user charge financed services such as solid waste collection and disposal, and privately provided water supply and sewage treatment systems. Future efforts to quantify and incorporate these forms of "tax equivalents" would be expected to further favor rural and/or nonmetropolitan local governments relative to Federal revenue sharing allocations.

Summary and Tentative Conclusions

Interest in non-tax sources of financing and support for a variety of community services has increased in recent years. Most of the increased interest relates to the fact that user charges for various services provided by State and local governments have been increasing as a proportion of total revenues from own sources. In addition, the omission of most forms of non-tax revenue and support from measures of fiscal or tax effort for revenue sharing allocations appears to introduce a systematic bias against rural and/or nonmetropolitan local governments.

Definite conclusions on the magnitude and "tax equivalent" significance of donations and fund raising events as well as volunteer support for various community services await further data collection and analysis. Revised econometric findings on price elasticities of charitable giving and pending legislation for additional tax deductions and/or credits for volunteer work suggest increased interest in and potential for these non-tax sources of community service finance and support.

APPENDIX I.—*How Federal revenue sharing allocations are made to local governments within a county area*

[Illustrative example]

	County X[1]
Formula	
1. The county-area allocation is distributed in each county area among the county, all municipalities as a group and all townships as a group:	
County-area allocation:	$1,016,000.00
2. The county government's share is determined by this formula:	
(*a*) Total adjusted taxes of county government	1,000,000.00
(*b*) Divided by total adjusted taxes of all governments in county area	4,000,000.00
Equals	.25
(*c*) County-area allocation	1,016,000.00
Multiplied by resultant figure	.25
County-government share of county-area allocation	254,000.00

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[1] Footnote 1 on p. 52.

APPENDIX I. *How Federal revenue sharing allocations are made to local governments within a county area*—Continued

3. The share of the aggregate of municipal and township government is:

(*a*) County-area allocation	1, 016, 000. 00
(*b*) Less county-government share	−254, 000. 00
(*c*) Allocation for all municipalities (and townships, if any)	762, 000. 00

4. The share of each municipality is determined by this formula:

City I:

(*a*) Population of municipality	20, 000
Multiplied by	
(*b*) General tax effort of municipality (total taxes of municipality, $1,000,000, divided by total income of residents of municipality, $100,000,000)	0. 01
Multiplied by	
(*c*) Relative per capita income of municipality (county-area per capita income, $2,800, divided by per capita income of municipality, $3,000)	0. 93
Total (20,000 times 0.01 times 0.093)	186
(*d*) The values determined thus for each municipality (186 plus 315) are multiplied	501
(*e*) The product of each municipality, 186, divided by the sum of products of all municipalities in the county area, 501	0. 371
Multiplied by	
(*f*) The allocation for the aggregate of municipal and township governments	$762, 000
Total	$282, 702

City II:

(*a*) Population of municipality	15, 000
Multiplied by	
(*b*) General tax effort of municipality (total taxes of municipality, $750,000, divided by total income of resident of municipality, $50,000,000)	0. 15
Multiplied by	
(*c*) Relative per capita income of municipality (county-area per capita income, $2,800, divided by per capita income of municipality, $2,000)	1. 40
Total (15,000 times 0.15 times 1.40)	3. 15
(*d*) The values determined thus for each municipality (315 plus 186) are multiplied	5. 01
(*e*) The product of each municipality, 315, divided by the sum of products of all municipalities in the county area, 501	0. 629
Multiplied by	
(*f*) The allocation for the aggregate of municipal and township governments	$762, 000
Total	$479, 298

[1] In this example county X is assumed to have 2 cities and no townships.

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THE WEALTH NEUTRAL PROPERTY TAX: SOME EVIDENCE FROM WASHINGTON STATE

[By Andrea Lubov*]

The California supreme court's decision in *Serrano* v. *Priest* (15) has had wide-ranging impact. Since the 1971 decision many States have modified their school aid formulas to conform to the court's ruling that expenditures on education should not depend on district wealth. These changes have tended to be one of two types: "share the wealth" programs such as Coons, Clune, and Sugarman's power equalization (2), or reduced reliance on local property taxes. As a by-product, the *Serrano* decision has also produced a renewed interest in the economics of inter-governmental aid and a realization that the effects of taxation and aid cannot be separated. Since the property tax is the principal source of revenue for local government, much of this work examines ways of making the property tax system more acceptable.

This reluctant acceptance of the property tax is a relatively recent phenomenon. In the not too distant past, most researchers would have concentrated on finding a replacement for the property tax, ignoring the possibility that the aid formula and the property tax levy could be treated as a single system. Now, however, the property tax is assumed to have properties worth retaining in the local finance system. Administrative problems have been reduced through the use of professionally trained assessors. Circuit breakers and homestead exemptions have been enacted to take care of, in part at least, some of the inequities associated with the tax. And even the regressivity argument is being challenged through the use of general equilibrium models which find that property taxes reduce the return on capital and consequently probably fall more heavily on higher income taxpayers than on the poor (1). Most important, many would argue, has been the recognition that all consumers do not have the same demand for public services, and that a system allowing local freedom to set both service levels and tax levies within certain prescribed limits will yield a more nearly optimum allocation of public goods and services to the nation as a whole (17). Finally, the property tax alone has been found to be ". . . amenable to small incremental changes in rate; other taxes seem practicable to administer only if rates are changed relatively infrequently and in relatively large discrete jumps" (8, p. 170).

This paper examines one of the newer developments in the systems approach to local finance, wealth neutral taxation. The discussion has four parts. First, the concept of wealth neutrality is introduced. A detailed examination of Feldstein's model for estimating the wealth neutrality of a revenue-aid system follows. In the third section of the

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paper the model is applied to data from Washington State and the empirical results are discussed. The paper concludes with some observations on further research on wealth neutral systems.

WEALTH NEUTRALITY

The standard definition of tax neutrality is well known to students of public finance:

> Taxes should accomplish their assigned objective, but beyond this they should not interfere with the functioning of the market system * * * It follows from the principle of neutrality that taxes should be imposed so as to place the least burden upon whoever is to be taxed (7, p. 141).

Wealth neutrality, or categorical equity, a concept proposed by Martin S. Feldstein (3) differs significantly:

> The principle of categorical equity singles out particular categories of services, such as education and health care, which are deemed to be "fundamental interests" and asserts that individuals' consumption of these services should not be allowed to differ substantially or, alternatively, that such differences should not bear a strong relation to the individuals' ability to pay (3, p. 76).

If expenditures on a social service, such as education, are wealth neutral, the State aid system is related to the property tax in such a way that the expenditure of each taxing district is unrelated to its wealth. Wealth neutrality is not the same as power equalization, although in one special case (to be illustrated in the third section) the two are identical. Further, a wealth neutral system is not necessarily income neutral. It is easy to imagine instances where taxing jurisdictions have a large per capita assessed valuation—due to the existence of industrial property—and low per capita incomes. The opposite is also likely—districts with high per capita incomes but relatively low per capita assessed valuation due to the absence of industrial or commercial property. Finally, it is important to keep in mind that within a single district the system is not wealth neutral: within a single district, wealthier taxpayers will pay a greater amount in taxes for the same bundle of services than will poorer taxpayers. In a wealth neutral system it is not impossible for a wealthier taxpayer in a poor district to pay less for the same level of services than would a poorer property owner in a wealthier district. For this discussion it is important to keep in mind that wealth neutrality focuses only on relative differences in wealth among districts.

FELDSTEIN'S WEALTH NEUTRALITY MODEL

Martin S. Feldstein has developed a model to determine the wealth neutrality of any given tax and aid system. His propositions about wealth neutrality are definitional and are not derived from any theoretical framework. However, the model provides a great deal of insight into the relationship between taxes and aid in a wealth neutral system and offers considerable guidance for policy makers interested in this issue.

The model begins with a simple definition of wealth neutrality: an expenditure system is wealth neutral when there is no relation between expenditure and wealth. Mathematically this occurs when the term α_1 in equation (1) is equal to zero:

$$(1)\qquad \ln E_i=\alpha_0+\alpha_1 \ln W_i+u_i$$

The term E_i is expenditure per pupil in the i^{th} community, W_i is wealth per pupil in the i^{th} community, α_0 is a constant to which no meaning is attached, and u_i is a residual uncorrelated with $\ln W_i$. When α_1 is equal to zero, there is no relation between wealth and expenditures. The presence of the residual term, u_i, allows expenditures to vary randomly among communities and yet be wealth neutral.

Equation (1) is not expressed in a particularly useful form, however. In fact, as will be shown below, the wealth neutrality coefficient, α_1, will not even be estimated directly. Instead, estimation begins by postulating that expenditures are related to wealth, and appropriate price variable, and several other socioeconomic variables, X_{ji}, to be defined later. This general relation is illustrated in equation (2):

$$(2)\qquad \ln E_i=\beta_0+\beta_1 \ln W_i+\beta_2 \ln P_i+\sum_{j=3}^{k} \beta_j \ln X_{ji}+\epsilon_i$$

Because the variables in (2) are expressed in natural logarithms, each coefficient is an estimate of the constant expenditure elasticity of that variable. It is important to note that this equation describes neither a demand nor a supply relationship. It is a behavioral equation that explains the natural log of expenditures in the i^{th} community.

The price variable, P_i, represents the local community's share of certain educational costs. Its exact formulation depends on the form of the State aid program. If aid is dispensed as a flat grant, P_i is equal to zero in all districts. If it is dispensed as foundation plan aid, P_i is equal to the fractional share of revenue guaranteed to the i^{th} district that is locally raised. When aid is dispensed as a matching grant, the price is equal to $1-m_i$, where m_i is the effective matching rate.

Given estimates of the parameters of (2), it is possible to proceed with the estimation of the wealth neutrality coefficient. Feldstein defines the relation between the parameters of (2), the general constant elasticity equation, and α^1, the wealth neutrality coefficient as follows:

$$(3)\qquad \alpha_1=\beta_1+\beta_2\gamma_{pw}+\sum_{j=3}^{k} \beta_j\gamma_{x_j w}$$

where γ_{pw} is the constant elasticity of price with respect to wealth and $\gamma_{x_j w}$ is the elasticity of socioeconomic variable X_j with respect to wealth.

In equation (3), β_1 reflects only the direct effects of wealth on expenditures and hence is a "partial wealth elasticity". The term $\sum_{j=3}^{k} \beta_j\gamma_{x_j w}$ measures the indirect influence of wealth through the effect of the socioeconomic variables x_j. These socioeconomic variables all relate indirectly to ability to pay and to that portion of personal wealth that generally escapes the property tax (*e.g.* intangibles, financial wealth, human capital). The combination of wealth's direct and indirect effects is its total influence. We shall call our estimate of wealth's total influence "total wealth elasticity" and label it β_w.

$$\beta_w=\beta_1+\sum_{j=3}^{k}\beta_j\gamma_{x_j w} \tag{4}$$

For clarity, it is useful to relabel $\beta_2=\beta_p$, the elasticity of expenditures with respect to the price of State aid. Now (3) can be rewritten as:

$$\alpha_1=\beta_w+\beta_p\gamma_{pw} \tag{5}$$

This is the form in which the wealth neutrality coefficient, α_1, will actually be estimated.

For policy purposes, equation (5) is the key equation. The parameters β_w, total wealth elasticity, and β_p, price elasticity, are fixed, for they are determined by the behavior of residents in the individual school districts. Their values can be estimated for any State. Policy makers can, however, control γ_{pw}, the elasticity of price with respect to wealth; and in doing so they may adjust the wealth neutrality of the system to any desired level. In Massachusetts, for example, the matching rate formula implies a γ_{pw} of 0.18. With power equalization, γ_{pw} equals 1.0 since a 1 percent increase in wealth means a 1 percent increase in price.

Some interesting results follow from equations (1) to (5) above. One of the most surprising is that power equalization will be wealth neutral only in the unlikely case that the absolute values of the expenditure elasticities of prices (which is expected to be negative) and wealth (which is expected to be positive) are equal. Empirical evidence from both Washington and Massachusetts suggests such a result is unlikely.

With some algebraic manipulation [1] a general expression for the price of State aid in the i^{th} district can be obtained. If there is complete wealth neutrality, the price of State aid to the i^{th} district must equal:

$$P_i=kW_i^{\gamma_{pw}} \tag{6}$$

At first glance, equation (6) appears to be a "magic formula" that enables the State legislature to make the present school aid program wealth neutral. The Legislature can control the price a district pays for State aid only indirectly, however. The variable over which the legislature has direct control is γ_{pw}, the elasticity of the price of State aid with respect to wealth. Since both β_w and β_p, the elasticities of revenue with respect to wealth and price, respectively, are exogenous to the legislature, a value of $\alpha_1=0$ in equation (5) implies the legislature has devised a school aid formula in which the elasticity of the price of the guarantee with respect to wealth is:

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[1] For there to be complete wealth neutrality, $\alpha_1=0$, hence:

(a) $\alpha_1=\beta_w+\beta_p\gamma_{pw}=0$ and (b) $\beta_p=-\frac{\beta_w}{\gamma_{pw}}$. This value of β_p can be substituted into (c). Equation (c) is equivalent to equation (2) except W_i has been redefined to include all wealth's direct and indirect influences.

(c) $\ln E_i=\beta_0+\beta_w\ln W_i-\frac{\beta_w}{\gamma_{pw}}\ln P_i$. Solving (c) for $\ln P_i$ and taking antilogs:

(d) $\ln P_i=\frac{\gamma_{pw}}{\beta_w}[\beta_w\ln W_i-\ln E_i+\beta_0]$

(e) $P_i=kW_i^{\gamma_{pw}}$. The estimation of β_w will be considered below in the text. See equation (8).

(7) $$\gamma_{pw} = -\frac{\beta_w}{\beta_p}$$

Equations (6) and (7) provide a constraint, not mentioned by Feldstein, that may well prevent a State from making its school formula completely wealth neutral. The constraint is that the value of γ_{pw} that would make the system wealth neutral must be less than or equal to 1. If it is not, wealth neutrality can be achieved only by radical reform of the school aid formula or reduced dependence on wealth. If the value of γ_{pw} that would achieve wealth neutrality exceeds 1, the price of $1 worth of State aid to all districts will exceed $1 by a very large amount. In effect all districts will make net payments to the State treasury.[2] An equivalent way of stating this constraint is that the absolute value of β_p must exceed the absolute value of β_w for it to be possible to achieve wealth neutrality simply by changing the price each district pays for State aid.

ESTIMATING THE WEALTH NEUTRALITY OF WASHINGTON'S SCHOOL FORMULA

All parameters needed to estimate α_1, the wealth neutrality coefficient, with the exception of β_w can be estimated in a straightforward manner. While it is possible to estimate β_w by first estimating each of the β_j values separately and then combining those estimates with the estimates for the corresponding γ_{xjw}, Feldstein illustrates a much simpler (and more direct) method for estimating β_w.

In the ordinary least squares estimate of the equation

(8) $$\ln E_i - \beta_p \ln P_i = b_0 + b_1 \ln W_i$$

the value of b_1 is an estimate of β_w. It follows from Theil's formula for specification bias that this estimate of β_w is exactly the same as could be obtained by direct substitution in (4) (*3*, p. 84 and *16*, p. 327)

An estimate of the elasticity of price with respect to wealth, γ_{pw} can be obtained by using ordinary least squares to estimate the value of b_3 in equation (9):

(9) $$\ln P_i = b_2 + b_3 \ln W_i$$

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[2] Refer to equation (6) above. If the average price to all districts of $1 of State aid exceeds $1, all districts are worse off after receiving State aid than they were before obtaining such aid. That γ_{pw} cannot exceed 1 can be seen with an example. Suppose that estimates of β_w and β_p indicate that wealth neutrality can be achieved if $\gamma_{pw}=2$. If per pupil taxable wealth increases by 1 percent, the price of State aid increases 2 percent. Further, suppose per pupil taxable wealth in the i^{th} district (in thousands of dollars) is $10—a value well below the statewide average. The price of $1 of State aid to the i^{th} district would be $100. Thus if this (relatively poor) district paid the State $100 per pupil, it would receive $1 per pupil in State aid. Such a system would be politically infeasible.

To estimate the wealth neutrality of the Washington school formula it is useful to change the dependent variable in equations (1) and (2) above from expenditures per pupil to revenues per pupil.[3]

In Washington, a school district's[4] revenue per pupil, REVPP, is a function of the following:

(1) Taxable wealth per pupil, AVPP;

(2) Price of state aid to the district, PGUAR;

(3) Per pupil categorical aid [both State (Statecat) and Federal (Fedcat)];

(4) Socioeconomic variables that determine the amount of special (tax override) levy revenue per pupil that school boards want and voters are willing to raise; and

(5) Cost differences between districts not otherwise accounted for by categorical aid, that arise, for example, from economies or diseconomies of scale.

Taxable wealth is measured by each district's assessed valuation per pupil, after equalization. The price variable employed is the average "price" per dollar of revenue guaranteed by the foundation plan. That price is

$$P_i = \frac{\text{Deductible Revenue}}{\text{Guaranteed Revenue}}$$

Deductible revenue is the portion of guaranteed revenue that is not paid by the State. It is a weighted sum of tax collections from several revenue sources, the largest of which is the regular property tax.

Per pupil State categorical aid, Statecat, and Federal categorical aid, Fedcat, were paid to those districts that qualified for such funds.

Although special levy revenues represented 21.1 percent of total revenue in the 168 districts in 1970–71, special levy revenue per pupil was not included as an independent variable in the revenue estimating equation. Its inclusion would have led to an equation that approached an identity. Estimation of the parameters of an identity would have led to an equation that fit the data well and yet contained no useful information. Instead, several socioeconomic variables that affect school boards' decisions about special levies were employed. These variables were chosen to capture the effects of income, age of the population, labor force composition, and taxable wealth composition. Labratio, the ratio of crafts to professional workers, and AGE, median age, were the socioeconomic variables finally included.

Size variables were also included in order to capture any economies or diseconomies of scale which existed. The only scale variable that was significant was ENROLL, school enrollment.

Since there was no *a priori* way to choose amongst the variables that determined special levy revenues, since there was no certainty that scale economies existed, and since the socioeconomic and scale variables were highly correlated, stepwise regression was used to allow the data themselves to determine the variables to be included. Selection of the special levy and economy of scale variables was made for an equation that was constrained to include the wealth, price and categorical aid variables that by hypothesis affected per pupil revenues in the 168 districts. The final results appear in table 1. Coefficients on all variables have the expected sign.

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[3] In Washington, revenue and expenditures need not be the same. Expenditures may be partially funded from past savings, while revenue reflects only funds raised in the current year. The wealth neutrality equations were estimated using both revenue and expenditures as the dependent variable in equations (1) and (2). Although the results did not differ substantially, the fit was much better when revenue was the dependent variable.

[4] The 168 districts examined included all districts that had the following characteristics: 1) at least 400 students in average daily attendance during the 1970–71 school year; 2) at least one high school; and 3) a special (tax override) levy proposed for collection in 1971. The 168 districts in the sample contained 94.4 percent of statewide school enrollment in 1970–71. The 1970–71 school year was chosen because it matched the census data and because it was the year examined in the unsuccessful constitutional challenge to the school formula (*9*).

Table 1
Estimate of Wealth Neutrality of Washington's School Formula

$$\text{REVPP} = \underset{(18.0139)}{6.2979} - \underset{(2.1361)}{0.1139}\ \text{PGUAR} + \underset{(5.6335)}{0.2354}\ \text{AVPP} - \underset{(2.4004)}{0.0255}\ \text{STATECAT} + \underset{(3.3928)}{0.0311}\ \text{FEDCAT}$$

$$-\underset{(2.2030)}{0.0405}\ \text{LABRATIO} - \underset{(2.5362)}{0.1743}\ \text{AGE} + \underset{(2.5330)}{0.0235}\ \text{ENROLL}$$

$\bar{R}^2 = .3550$ $n = 168$ school districts $\beta_w = .1992$ $\alpha_1 = .1067$

$F = 14.132$ $\gamma_{pw} = .8118$

Note: Values in parentheses are absolute values of t-statistics. See text for definitions and descriptions of the data sample and variables used.

Since all variables in the equation have been expressed in natural logarithms, each of the regression coefficients is an estimate of the constant elasticity of total revenue per pupil with respect to that variable. The negative coefficient of PGUAR was expected. Its size was surprising, however. The results support the hypothesis that revenues per pupil in Washington are price inelastic, or price insensitive. In contrast, Feldstein's estimates for Massachusetts vary between −0.940 and −1.599, indicating that expenditures in that State are price elastic. Given the elasticity estimates reported in table 1, for every 1 percent decline in the price of the per pupil guarantee, in Washington, revenues per pupil would increase by only 11/100 percent.

The exceedingly low price elasticity of State aid has another important implication given Washington's institutional structure. A 1 percent decline in the price of State aid (an increase in the per pupil guarantee with local dollar support unchanged) will yield virtually no increase in revenues per pupil. All independent variables in the equation are exogenous to local school boards, but boards do have some control over special levy revenues. Therefore, school boards can be expected to match increased State aid, practically dollar for dollar, with decreased special levy revenue. In other words, school boards in Washington, on the whole are quite insensitive (although surely not oblivious) to the price they pay for State funds. Their concern is with the total revenue available per pupil and not with the relative share provided by State or by local funds.

The estimate of the wealth neutrality coefficient, α_1, for Washington State is .1067. (For comparison, Feldstein estimated its value is .19 in Massachusetts.)

By definition, a system is wealth neutral when the wealth neutrality coefficient, α_1, of equation (1) is equal to zero. Again, by definition, the lower the value of α_1, the closer the system is to achieving wealth neutrality. However, the value of α_1 does not tell the whole story. Low values of α_1 may occur for two very different reasons—reasons which are clearer when we remember that the wealth neutrality coefficient consists of two components: a wealth component, β_w; and a wealth neutralizing component, $\beta_p \Upsilon_{pw}$. Wealth neutrality may occur as in Massachusetts where the wealth effect, β_w, is strong; but the wealth neutralizing effect, $\beta_p \Upsilon_{pw}$, is also strong, in effect "neutralizing" the wealth effect. Or, α_1 may be low when the wealth effect, β_w, is very small and the wealth neutralizing effect is even smaller, as in Washington. There the low value of α_1 is due to weak dependence on wealth, and not to that dependence being neutralized.

This distinction between the two types of wealth neutrality is subtle, but it has important implications for reform. In the Massachusetts situation, complete wealth neutrality can be achieved by adjusting the price formula. In Washington, complete wealth neutrality can be achieved only by reduced dependence on wealth, or by radicial reform of the school support formula.

FURTHER RESEARCH

Since research on wealth neutrality is in its early stages there are many questions about it remaining unanswered. It is convenient to group the unanswered questions under three headings:

(*a*) Questions raised in the Washington study;

(*b*) Questions that could be answered by studying the wealth and/or income neutrality of expenditures on other government services; and

(*c*) Questions that could be answered by changing the unit of study to individual households.

Questions from the Washington Study

Both the absolute and relative sizes of the Washington price and wealth expenditure elasticity estimates differed from Feldstein's Massachusetts estimates. It is not clear whether the differences are due to the nature of foundation plan aid or whether they reflect attributes unique to Washington. This question can be answered empirically by repeating this study in another State that uses foundation plan aid.

If similar elasticity estimates are found in other foundation plan States, some effort should be directed toward designing school formulas that neutralize community differences in wealth without reducing dependence on wealth.

Other Neutrality Studies

Wealth neutrality analysis need not be limited to expenditures on education. Indeed, the analysis can even be extended to measure other kinds of neutrality. This kind of analysis could be used, for example, to learn whether welfare taxes and expenditures neutralize inter-county income differences. Neutrality can be examined for any taxing and expenditure program characterized by earmarked taxes and intergovernmental aid.

Neutrality of Individuals' Expenditures

Changing the unit of analysis to the household would permit dropping the unrealistic assumption that residents of a taxing jurisdiction are homogeneous. It would be desirable to design taxation and aid programs that neutralize *household* differences in income and/or wealth. For example, households could be given vouchers to be applied toward the purchase of certain public services. The size of the voucher would vary with income or wealth and taxes would be collected from all households. Health care, education, and recreation are only a few of the many public services whose benefits could be redistributed in such an income or wealth neutralizing manner.

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SMALL BORROWERS IN THE MUNICIPAL BOND MARKET: DOES SIZE MATTER?

[By John E. Petersen*]

The size of an issuer or issue of municipal securities matters in the municipal bond market. Size alone is not the most important determinant of the cost of the borrowing or the availability of funds. Other characteristics of the debt or debtor such as type of security, the condition of the credit market, the location of the issuer, creditworthiness (or the commonly employed equivalent measure thereof—the bond rating) are all of greater importance in determining the cost of borrowing than mere size. However, these other characteristics are often highly correlated with the size of the issue and frequently the nature of that correlation is such as to increase interest costs. On the other hand, small issuers with strong local markets for their bonds can do well in the municipal bond market. But, on average, small, infrequent issuers of tax-exempt securities usually pay more to borrow, all other things being equal. Furthermore, having fewer financing alternatives for capital projects, they more frequently find that high costs of borrowing in chaotic markets or a lack of access to the national market forces a reduction in or cancellation of spending plans.[1]

Because debt capital is particularly important in the financing of local government capital projects, the ability of small units to successfully borrow is of key importance to maintaining or improving community facilities.[2] Therefore the treatment of the small borrower in the municipal bond market has been and continues to be a question of considerable policy importance. As we shall review, many things can be done to improve their position in the capital markets.

In this paper we do the following things:

1. Review briefly the place of the small governmental issuer in the municipal bond market, noting recent changes of significance in the market that have a bearing on small issuers;
2. Discuss the components of the cost of borrowing differentials as a function of size, citing recent empirical evidence as to the magnitude of those differentials; and
3. Consider various forms of assistance by either the State or Federal government to small borrowers and review their potential value.

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[1] See R. Forbes and J. Petersen, *Building a Broader Market* (New York, Twentieth Century Fund, 1976), pp. 65-67 and footnote 2.

[2] Long-term borrowing is used to finance 50 percent of State and local government capital outlays, but the proportion of debt-financed projects is probably higher for smaller local governments. See J. Petersen and H. Galper, *Forecasting State and Local Capital Outlays and Their Financing* (Washington, D.C., Urban Institute, 1970), pp. 2-5.

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Role of the Small Issuer in the Municipal Bond Market[3]

An outstanding characteristic of the municipal bond market is the large number and diversity of issuers and issues of debt. The same basic market mechanism is called upon to float the massive borrowing of such entities as the New York Municipal Assistance Corporation (which borrowed $1 billion one week in July, 1975) and to handle issues as small as $10,000 or $20,000 offered by small municipalities or special districts. Between 1970 and 1975, approximately 50,000 separate tax exempt issues came to the marketplace, many times the number of corporate issues handled during the same period of time. In 1975 alone, a year of extremely chaotic conditions in the tax exempt securities market, nearly $60 billion in municipal securities were marketed through 4,700 bond sales and 3,400 short term note sales.[4]

The large number of issues and issuers means that the average offering is relatively small. While there has been a trend toward fewer and larger offerings in the municipal bond market, the average tax exempt security is still only about one-fourth the size of the average corporate borrowing.[5] The complexity in the market created by the large number of issuers and separate bond issues is compounded by the structural characteristics of the instrument itself. Most municipal securities are sold as serial bonds and an issue may have as many as 30 or 40 different maturities and perhaps a dozen or more different coupons throughout the continuum of principal payments. Such fragmentation and heterogeneity in the market for municipal securities leads to marketing and distribution costs that are typically minimized when issues brought to market are sufficiently large to generate economies of scale and maximize investor competition for the securities offered.

TABLE 1.—PERCENTAGE DISTRIBUTION OF MUNICIPAL BOND NEW ISSUES, BY SIZE OF ISSUE, 1974

Size of issue (millions)	General obligations (percent)		Revenue (percent)	
	Number of issues	Total dollar amount	Number of issues	Total dollar amount
Less than $0.5	34.4	1.7	12.2	0.4
$0.5 to $1	16.9	2.7	11.9	1.0
$1 to $2.5	21.3	7.5	25.8	4.3
$2.5 to $5	13.0	10.1	17.9	7.1
$5 to $10	7.9	12.0	12.7	9.9
$10 to $25	3.5	11.8	10.7	18.4
$25 to $50	1.3	10.0	5.2	19.9
Over $50	1.8	44.2	3.6	30.0

Source: R. Forbes and J. Petersen, "Building a Broader Market," p. 92.

The vast majority of municipal bonds are small by market standards. As table 1 illustrates, more than 70 percent of the number of general obligation bonds sold in 1974 were for less than $2½ million. Only 2 percent exceeded $50 million in size. However, the 70 percent that were less than $2½ million in size amounted to only 12 percent of the total dollar volume of bonds sold, whereas the 2 percent in excess of $50 million represented 44 percent of the volume of funds raised. As is shown in table 1, revenue bonds tend to be larger than general obligation issues, but here again over 50 percent of the number of bonds sold were less than $2½ million in par value.

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[3] Brief descriptions of the market's structure and operation are found in G. Hempel and J. Patton, *Understanding the Municipal Bond Market* (Washington, Advisory Commission on Intergovernmental Relations 1976) and in *Building a Broader Market*, Chapter 1.

[4] For a discussion of the turbulent market conditions of 1975, see *Building a Broader Market*, Chapter 5.

[5] In 1965, 6,000 bond issues were sold and the average size was $1.8 million. In 1975, 4,700 were sold, the average size being $6.2 million.

Because of the serial payment structure, an issue that is already small by market standards is further subdivided into subsets of even smaller individual issues for purposes of pricing and trading. A $2½ million bond issue may contain bonds maturing each year over 25 years with only $100,000 of bonds maturing in any one year. In most cases, each block of $100,000 worth of bonds is going to be treated as different securities from another block maturing at a different date because interest rates for each maturity will be different, reflecting market preferences and expectations.

For underwriters and investors, the diversity of maturities and the small size of blocks can create considerable bookkeeping, storage and transportation problems with any municipal, but especially so with the small issue. The institutional investment manager having a large number of different securities in portfolio incurs greater costs in clipping coupons, recordkeeping, and credit analysis in order to maintain a portfolio. Certain costs borne by underwriters are fixed and are not dependent on the size of the transaction. Thus, for example, the costs of transactions and operating back offices are quite likely to be the same for an underwriter, whether he sells two or 200 bonds. Fixed costs per unit will be proportionately smaller, the larger the transaction. This illustrates that economies of scale present in the marketing and investment management of bonds favor larger issues.

Size of Issue and Borrowing Costs

Several studies have examined the influence of size upon State and local government borrowing costs. Most that have been designed to specifically isolate the effects of the size of the issue on interest paid have found a U shaped relationship between the size of issue and the interest rates that the issuer must pay.[6] That is, very small issues appear to sell at a price discount (higher interest rate), in part to offset the higher market costs. At the other extreme, those of very large size must pay higher rates of interest than those of moderate size, principally because of market congestion. Thus, the shape of the cost curve in relationship to issue size is usually found to be flat over an extended range of volumes, and appears to be at a minimum somewhere in the range of $10 to $50 million issue size.[7]

Figure 1 reflects the relationship between size of issue and net interest cost for general obligation bonds with an average life of 10 to 15 years that are otherwise fairly comparable.[8] Shown are the differences in rates in basis points (hundreths of a percentage point) by size of issue measured as deviations from a standardized market index, the *Bond Buyer* 20 Bond Index. As may be seen, for all bonds

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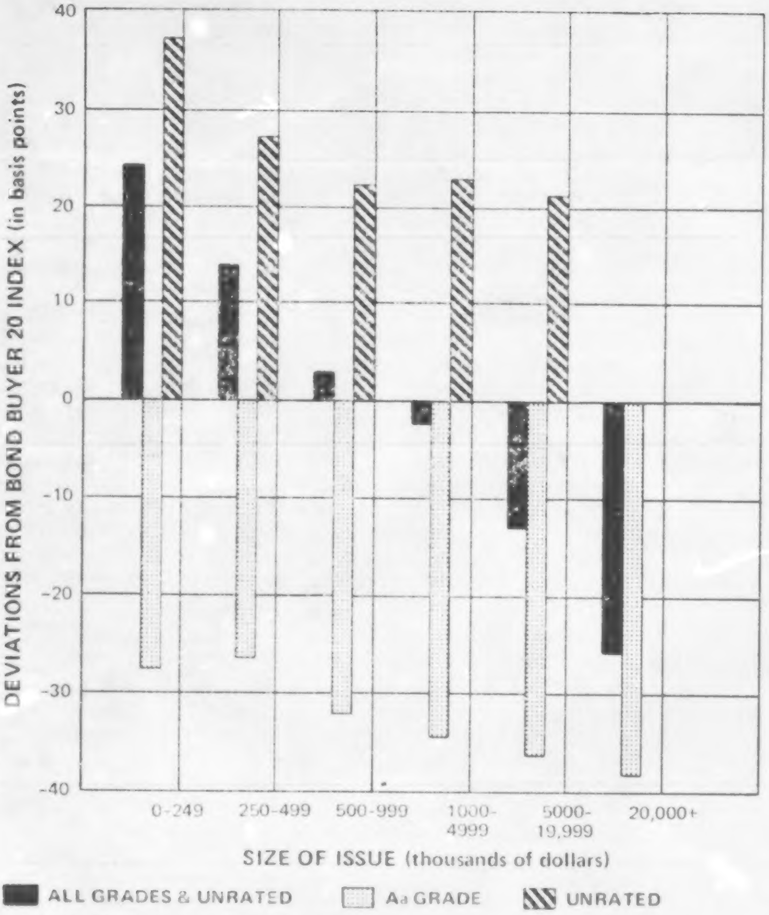
[6] R. Robinson, *Postwar Market for State and Local Government Securities* (Princeton, Princeton University Press, 1960), p. 129; C. Phelps, "The Impact of Tightening Credit on Municipal Capital Expenditures" *Yale Economic Essays* (Fall, 1961). Generally, in regression models where issue amount enters as a first-order linear explanatory variable of interest cost, the coefficient is negative. See, for example, R. Kessel, "A Study of the Effects of Competition in the Tax-exempt Bond Market" *Journal of Political Economy* (July-August, 1971).

[7] See J. Petersen, *The Rating Game* (New York, Twentieth Century Fund, 1973), p. 133.

[8] Net interest cost is a simple interest concept that is unique to the municipal bond market. It is calculated by dividing net interest paid by the weighted total of debt that will be outstanding, weighting the amount in each maturity by the number of years of that maturity ("bond years"). This method of measuring interest cost can lead to inefficiencies in the market. See M. Hopewell and G. Kaufman, "Costs to Municipalities of Selling Bonds by NIC" *National Tax Journal* (December, 1974).



Source: J. Petersen, The Rating Game.

FIGURE 1.—Comparison of costs by size and grade of bond issue as measured by deviation from Bond Buyer 20 Index. (By issue size for Aa, unrated, and average of all grades, General Obligation Bonds with 11 to 15 years average life, 1967 through mid-1974.)

regardless of credit rating, the net interest cost declines as issues become larger. Issues smaller than $½ million pay on average 30 to 45 basis points more than those of $5 to $20 million. Also shown in Figure 1 are relationships for high grade (Aa) and non-rated bonds. Holding the rating constant, the size effect is less, but still significant. Generally, issues of less than $½ million pay 10 basis points more than those in the $5 to $20 million bracket that carry the same rating.[9]

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[9] For very small units, it may not pay to get a rating because the rating fee would be larger than the interest cost savings. Larger issues do not have the option because a nonrated issue would be automatically suspect. See *The Rating Game*, p. 50.

COMPONENTS OF BORROWING COSTS

Most, but not all, issuer borrowing costs are captured by the net interest cost paid by issuers. There are three component parts to the total costs of borrowing, and we now review these separately. Generally, these may be classified as (1) the costs of preparing issues for sale or flotation costs other than underwriting compensation; (2) the cost of underwriting as reflected in dealers' gross profit margins (or "spreads" as they are known in the market), and (3) investor requirements for yield to meet their risk-return demands. The first cost, that of preparation, is normally not reflected in the net interest costs paid by the issuer to the underwriter but rather is out of pocket and internalized in the issuer's expenses. The second two costs, the underwriter profit and the reoffering price to the public, are reflected in the interest costs that the issuer must pay on the bond issue throughout its life. In all three instances, the cost of borrowing per unit decreases with the size of the issue, except (as noted) in the case of very large bond issues.

Sale Preparation Costs

A survey of marketing costs for municipal bonds done in the early 1970's by the Municipal Finance Officers Association found that the costs of bringing an issue to market varied greatly by size of issue and by type of security offered for sale, ranging from an average of less than a $1 per thousand for general obligation bonds in excess of $25 million to over $15 per thousand for special assessment bonds of less than $500,000 in size.[10] The costs of flotation as reported by the MFOA survey represented only those out-of-pocket costs that were included in preparing and publishing bond notices and prospectuses, printing bonds, bond rating fees, various legal and advisory fees, and special election costs when incurred. As table 2 indicates, these costs of flotation tended to be approximately 9 times as great per dollar borrowed for issues under $2 million in size than for issues in excess of $20 million. In the case of municipal revenue bonds, the cost per thousand was uniformly greater, being in excess of $12 per thousand for issues under $2 million in size. The flotation costs for municipal securities, therefore, exhibit a high degree of economies of scale. It is clear from the evidence that savings can be enjoyed by spreading largely fixed costs of legal and fiscal advise, printing and bond ratings over larger volumes of proceeds in large bond issues.

TABLE 2.—BOND SALE PREPARATION: MUNICIPAL BONDS, BY SIZE OF ISSUE; COST PER $1,000 OF GROSS PROCEEDS

Size of issue (millions)	Type of security	
	General obligation	Revenue
0 to $2	$8.78	$12.25
$2 to $5	4.74	6.74
$5 to $10	3.32	5.44
$10 to $20	2.65	2.94
$20 and over	.80	2.34

Source: See table 3.

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[10] Municipal Finanace Officers Association, "Costs Involved in Marketing State/Local Bonds" (1972). The survey was based on 496 bond sales, most of which took place in 1971 and 1972. It should be noted that the costs of flotation have increased, perhaps greatly, because of the much greater emphasis on disclosure needs.

Underwriting Costs

The second major element in the cost of borrowing for local government issuers is that of underwriting compensation. This is the margin of gross profit which the underwriting securities firm or bank receives for redistributing the securities to the final investor. Underwriting spreads must compensate underwriters both for their operating costs of doing business, as well as compensate them for the capital risks they undertake in the transaction. Table 3 illustrates underwriter compensation on municipal securities.[11] Again, there is systematic variation with both the size of the issue and the type of security: the average underwriting spread is greatest for small issues and gradually diminishes for larger issues. Combining the results of the underwriting compensation and cost of flotation studies, it can be seen that the total cost of marketing bonds was approximately 2 times greater per dollar borrowed for municipal offerings smaller than $2 million than for those in excess of $20 million.

TABLE 3.—UNDERWRITER COMPENSATION: MUNICIPAL BONDS, BY SIZE OF ISSUE: COST PER $1,000 OF GROSS PROCEEDS

Size of issue (millions)	Type of security	
	General obligation	Revenue
0 to $2	$12.00	$14.80
$2 to $5	11.50	14.30
$5 to $10	11.00	13.80
$10 to $20	10.75	13.35
$20 and over	9.75	11.50

Source: R. Doty and J. Petersen, "The Federal Securities Laws and Transactions in Municipal Securities," Northwestern University Law Review (forthcoming).

The cost of underwriting small bond issues is proportionately higher because of the higher unit cost involved in submitting bids for small issues and marketing and subsequent distribution of smaller blocks of bonds. But gross spreads are also higher because of lower levels of competition for small issues. The lessened demand is evidenced by the fewer bids received for small bond issues that are competitively sold. Studies have found correlations between the number of bids submitted on municipal bonds and interest cost.[12] One recent study using a sample of bonds sold in the summer of 1973 found that the bidding pattern by size of issue had an inverted U shape, the peak number of bids occuring at approximately $12 million level and with smaller and larger issues receiving fewer bids.[13] Table 4 illustrates the relationship between the number of bids received for bond issues and their size, for the year 1974. Small general obligation bonds of less than $2.5 million often received only one bid, showing that very small issues and issuers may find investor interest very restricted. On the other hand, issues in roughly the $2.5 to $25 million range receive four or more bids over 60 percent of the time. Finally, large issues in excess of $50 million attracted a smaller number of bids for

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[11] Table 3 is based on Kessel's work using 1959-1968 data. See R. Doty and J. Petersen, "The Federal Securities Laws and Transactions in Municipal Securities" *Northwestern University Law Review* (July-August 1976).

[12] See Kessel, *op. cit.*, pp. 706-738.

[13] M. Hopewell and G. Kaufman, "Commercial Bank Bidding on Municipal Revenue Bonds: New Existence" *Journal of Finance* (forthcoming).

TABLE 4.—PERCENTAGE DISTRIBUTION OF THE NUMBER OF BIDS BY SIZE OF ISSUE FOR ALL COMPETITIVELY SOLD MUNICIPAL BONDS, 1974

Size of issue (millions)	Percentage distribution of the number of bids received					
	1	2	3	4	5	6 or more
General-obligation bonds:						
Less than $0.5	86.0	3.1	3.2	2.6	1.9	3.2
$0.5 to $1	80.1	1.8	5.1	3.3	3.9	5.7
$1 to $2.5	12.1	11.2	15.4	13.2	13.3	31.8
$2.5 to $5	13.4	11.9	17.0	16.4	11.2	30.2
$5 to $10	5.8	14.1	13.6	17.0	8.3	41.3
$10 to $25	15.1	9.7	15.1	8.6	9.7	41.9
$25 to $50	20.6	11.8	14.7	23.5	11.8	17.6
Over $50	6.7	15.6	42.2	13.3	8.9	13.3
Revenue bonds:						
Less than $0.5	98.0	1.0	0	1.0	0	0
$0.5 to $1	95.5	2.2	1.1	0	1.1	0
$1 to $2.5	27.1	18.9	19.5	17.5	6.4	10.5
$2.5 to $5	36.1	22.3	7.3	12.3	12.3	9.7
$5 to $10	17.4	23.3	23.3	18.8	11.5	5.8
$10 to $25	19.1	14.9	14.9	27.7	12.8	10.6
$25 to $50	12.5	29.2	41.7	4.2	12.5	0
Over $50	5.6	61.1	22.2	5.6	5.6	0

Source: R. Forbes and J. Petersen, "Building a Broader Market," p. 95.

sale. Revenue bonds generally attracted even fewer when sold competitively and seldom did a bond issue of less than $1 million receive more than one bid.

The number of bids submitted by underwriters is an important indication of the strength of market demand for the security. Few bids reflect not only a lack of competitive interest on the part of underwriters but, more fundamentally, a lack of ultimate investor interest needed to stimulate underwriters to bid on smaller bond issues. The resale market simply is not there for very small issues to make it worthwhile for underwriters to participate in the bidding process.

Reoffering Yields

Final investors, mainly the large institutions that invest the bulk of funds in municipal securities, have a limited appetite for small issues; this reflects itself in higher market yields on those bonds.[14] Several factors account for this, the most important being the higher costs of operating portfolios with small blocks of bonds, the greater difficulties in determining the credit quality of small bond issuers, and the weakness in secondary market performance by small issues. Investors, of course, do purchase small issue municipal securities. But in so doing they typically require higher reoffering yields on the securities, which increases the cost of borrowing to the issuer. Generally, reoffering yields are estimated to decrease at a rate of approximately 1½ basis points per $1 million increase in issue size.[15]

Turning to the problem of credit quality and size of issue, table 5 indicates that higher bond ratings are typically associated with larger bond issues in both the case of the general obligation and revenue bond issue. A small issuer more often received a lower rating or, in many cases, no rating at all. Interest cost is highly associated with the bond rating and the differentials among the grades have grown greatly over the last 2 years. The municipal bond market tends to

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[14] For a discussion of municipal investors, see *Building a Broader Market*, Chapter 6.

[15] Kessel (*op. cit.*, pp. 725–726) in his regressions explaining reoffering yields found that, *ceteris paribus*, they decreased about 1.4 basis points per $1 million increase in size of issue.

TABLE 5.—RELATIONSHIP BETWEEN MUNICIPAL BOND RATINGS AND AVERAGE ISSUE SIZE, 1974

[Dollar amounts in millions]

Moody's ratings	General obligation		Revenue	
	Number of issues	Average size	Number of issues	Average size
Aaa	231	$13.13	27	$15.85
Aa	583	6.00	158	10.27
A	1,313	4.33	588	9.65
Baa	399	1.98	189	6.78
Unrated	925	1.09	416	2.88

Source: R. Forbes and J. Petersen, Building a Broader Market, p. 96.

rely more heavily on the quality estimation of the credit rating agencies when it comes to small issues. Also, investors rely on agencies' credit evaluation rather than doing it themselves simply because in most cases it is not worth the cost for small issues where the commitment of capital by the investor will itself be small and the degree of risk is fairly low.[16]

Investors and dealers owning securities must be sensitive to their possible performance in the secondary market for outstanding bonds. Here again, the small issuer's securities are at a disadvantage. The secondary market for municipal securities, due to the large number and variety of issues, is wholly an over-the-counter market. It is best organized at the wholesale level in which trades are conducted between dealers and brokers. A recent study indicates that the wholesale market tends to be dominated by offerings of well-known issues and issuers.[17] This means that a more active market is generally available for larger and better known borrowers. Moreover, trading small lots in the market is costly and investors who liquidate their holdings prior to maturity must be prepared to pay larger transactions margins on smaller issues.

The above evidence that borrowing cost differentials increase for small issues does not prove the contention that small issues are either being rated unfairly or that the market is operating irrationally. As noted, there are in fact higher costs per unit in the preparation for sale and handling of smaller issues. Furthermore small issue size typically represents added elements of risk, both in the secondary market and its possibility of adverse price performance and in the risk of possible delay of payment or default. Studies done in the area of credit quality demonstrate that small size and those characteristics correlated with it represent added risk because of a lack of economic diversification, less sophisticated management, and restricted revenue bases.[18] Outside the large revenue bond defaults of the postwar period and the much publicized difficulties of several large borrowers in the Northeast, the fact remains that the frequency of payments is difficult and defaults have been highest among small units.

Investors often encounter greater difficulty in making a true estimation of the risk involved in small issues because of the lack of credit information.[19] Both the sales documentation used in the offering of securities and the current reporting of economic and fiscal conditions tend to be especially deficient for small borrowers. Reports that underwriters and ultimate investors need in making decisions about purchasing and holding municipal securities are frequently late or incomplete, or, in some cases, nonexistent for the very smallest borrower. A recent study of official statements distributed by borrowers in conjunction with bond sales found that, despite a dramatic improvement in such documents over the last year, those supplied by smaller units had shown the least improvement and tended to be less complete in terms of vital items of information.[20] Although it would appear that the simple economies and finances of small units would make them relatively easy to report, the true situation seems to be their lack of sophistication and awareness have kept sales documents from being upgraded to meet the higher demands. By the same token, it should be understood that because of the local market for these securities, there appears to be less concern over defrauding the public or investor when it comes to small jurisdictions. Nonetheless, the lack of information given to the market by small issuers probably needlessly restricts the marketability of their securities and contributes to increased interest costs.

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[16] On investor uses of ratings in general, see *The Rating Game*, Chapter 4.

[17] K. Hastie, "Determinants of Municipal Bond Yields" *Journal of Financial and Quantitative Analysis* (June, 1972).

[18] See *The Rating Game*, pp. 113–116, 135.

[19] *Ibid.*, p. 87, and *Building A Broader Market*, Chapter 8.

STATE AND FEDERAL ASSISTANCE TO SMALL BORROWERS

A wide variety of vehicles are open to the States and Federal government in helping to lower the cost of debt capital for small borrowers. These range from the small costs and limited degree of involvement arising from more enlightened State requirements for local borrowers and various forms of nonmandatory technical assistance through elaborate and potentially expensive programs of direct credit assistance (such as national development banks or Federal loan guarantees). In this section, we briefly review the major types of assistance programs particularly aimed at helping the small borrower, first at the State and, next, the Federal level. A major focus is their potential impact on the cost of borrowing for small units.

State Aids to Local Borrowing

At the most basic level, State laws set the parameters within which local governments can borrow.[21] Typically, these are complex requirements that specify the types of securities that may be sold, certain characteristics of the instruments used, the process by which bonds are authorized, methods by which they are advertised and awarded, and certain limits on the amount of debt that may be outstanding and interest rates that may be paid. These provisions are usually restrictive and do not have as their primary aim helping issuers in the market.[22]

Other State activities, however, can be more positive in orientation and often seek to facilitate worthwhile borrowing and to lower the costs of borrowing. For example, some States have centralized agencies that actively supervise the financial conduct of local governments, especially those phases that have to do with debt management. The best known of such comprehensive State supervision programs is that of the Local Government Commission of North Carolina, which approves and centrally markets local government bond and note issues, in addition to attending to a variety of other supervisory functions for local units. Studies indicate that the Local Government Commission's activities have improved the market for North Carolina bond issues.[23] Other States employ a variety of direct credit assistance activities, including loan guarantees and insurance, direct loan programs, and intermediaries known as bond banks to bundle small issues into large ones.[24]

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[20] J. Petersen, R. Doty, R. Forbes, and D. Bourque, "In Search of Standards: Disclosure in the Municipal Bond Market" *Duke Law Journal* (forthcoming).

[21] See Advisory Commission on Intergovernmental Relations, *State Technical Assistance to Local Debt Management* (Washington, 1965).

[22] See J. Petersen and L. Cole, "An Inventory of State Supervisory and Technical Assistance Activities Pertaining to Local Government Activities" (unpublished, October, 1976, draft).

A recent survey of institutional investors in municipal bonds asked how various forms of State assistance including various supervisory activities and reporting requirements would influence their opinion of a local obligation. The highlights of the survey's results are given in table 6. Generally, the survey results indicate that a local government's average general obligation bond (of either relatively weak or strong credit) could incrementally improve its standing among all other bond issues by the percentage points shown in the table, if it were the recipient of the type of assistance listed, all other factors being equal.[25] The table clearly shows that direct guarantees of local government debt or the earmarking of State aid to debt service is of greatest value (much greater than the nonbinding pledge involved in moral obligations). Forms of assistance that include no pledge of the State's credit, but rather, involve State oversight of debt service payments by local governments or the supervision of their finances and bond issuances can also be of considerable help. As one might anticipate, the degree of improvement derived from assistance is greater, the lower the credit quality and, usually, the smaller the size of the issuer. Last, it should be noted that private bond insurance plans reduce the costs of borrowing; however, the savings may be largely offset by the payment of the insurance premium.[26]

Although the analysis relating the marginal changes in credit score to differences in interest cost is not yet complete, a first approximation is that under current market conditions each percentage point charge in the score assigned by investors is worth two to three basis points in interest cost. The differences in borrowing costs attributable to State assistance as found in the survey evidently agree with other empirical measures of the value of such programs.[27]

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[23] See *The Rating Game*, p. 135.

[24] See *Building A Broader Market*, pp. 96-99, 132-137.

[25] The survey, conducted as part of a large-scale effort to evaluate various methods to improve municipal credit reporting practices and credit quality, was designed to determine how investors perceived the relative importance of various major components of municipal credit information. Those surveyed were provided several condensed credit reports that contained several commonly-used measures of debt burden, financial activity, and economic-demographic characteristics for a hypothetical midwestern city selling a general obligation bond issue of specified size. Although hypothetical, the case studies were based on statistics drawn from a large number of credit reports for actual bond offerings. Respondents were asked to rank the issue's relative creditworthiness in relationship to all other bond issues on the basis of the information provided. This was done by assigning a score of between 1 (lowest quality) to 100 (highest quality).

Among the exercises respondents performed was to indicate the revised ranking that they would assign on the basis of additional or revised information. Several of the items of new or different facts about the bond issue dealt with forms of State credit assistance and financial supervision. Table 6 illustrates the incremental impact on the rankings of units for several types of State assistance programs to local general government bond issuers. In these cases, the respondents were asked what would be the new credit score given to the unit, if in fact one of the credit programs were to apply to the bonds being sold, everything else being the same. Differences between the original and new score can be used to measure the marginal impact of the program; these are shown in the table. J. Petersen, "Impact of State Credit Assistance and Information Requirements on Investor's Rankings of Municipal Bond Creditworthiness" (unpublished draft).

[26] Private municipal bond insurance premiums are typically ½ to 1½ percent of the principal and interest sold. See *Building A Broader Market*, p. 134.

[27] J. Petersen, "Impact of State Credit Assistance," p. 6.

TABLE 6.—INCREMENTAL IMPACTS OF STATE CREDIT ASSISTANCE ON CREDIT SCORES OF CITY GENERAL OBLIGATIONS, BY CREDIT QUALITY AND SIZE OF CITY

	Large	Medium	Small
Full State guarantee:[1]			
Strongest	8.8	9.3	10.8
Weakest	29.6	37.1	36.0
Overall	24.7	25.8	24.3
State moral (nonbinding) obligation:[2]			
Strongest	2.3	1.7	.8
Weakest	6.7	8.3	5.3
Overall	4.1	5.2	4.7
State aid earmarked for local debt service:[3]			
Strongest	4.9	4.9	5.0
Weakest	16.4	18.3	18.2
Overall	11.2	12.9	12.6
State supervision and approval of finances:[4]			
Strongest	1.2	1.1	1.5
Weakest	2.7	4.4	4.6
Overall	2.7	3.1	3.4
State-administered debt service fund:[5]			
Strongest	3.3	3.4	3.8
Weakest	6.4	7.9	11.6
Overall	5.9	7.8	6.8

[1] The bond issue is guaranteed by a State statute that makes the timely payment of debt service a general obligation of the State (State is rated AAA).

[2] A bond issue is backed by a State moral obligation—a statutory provision that permits (but does not require) the timely payment of debt service (State is rated AAA).

[3] The debt service on this bond issue is fully covered by State aid payments earmarked by State statute for this purpose.

[4] This city's annual budget and all borrowing, including the bonds being offered, have been approved by a State agency that supervises local government debt administration (such approval is mandatory prior to debt issuance).

[5] The bond issue requires that there be maintained a State-administered debt service fund equal to the maximum annual debt service on this issue (there is no further State obligation).

Federal Assistance

Several existing programs at the Federal level are directed at supplying credit assistance to smaller governments. These generally take the form of direct loan programs or guarantees aimed at ensuing small issuers a favorable market for their issues. Like some State assistance programs, Federal credit assistance programs exist for reasons other than simply assisting small issuers to borrow more cheaply: the primary objective usually is to promote some particular type of expenditure or capital facility and facilitating small unit borrowing is a means to that end (although it may involve a heavy subsidy).[28] As a result, certain types of borrowers and uses of proceeds are given a preferred position over those who are not assisted.

The most common types of Federal assistance programs for small governmental issuers involve loans and loan guarantees. The Economic Development Administration (EDA) and the Farmers Home Administration (FmHA) both make or guarantee loans to small governmental units that satisfy the criterion that they cannot get financing in private markets at reasonable rates of interest. The community facilities financed by these loans are typically related to economic development: water and sewer systems, harbors, terminals, roads, and industrial parks.[29]

Federal credit assistance has typically been administered through one of the line agencies in support of particular programs. Recently, however, proposals to form something akin to a national development bank have been gaining more notoriety.[30] A principal motivation of supporters of the development bank seems to be a desire to retain or attract more economic activity in the Northeast and other regions of relatively high unemployment. The scope of the contemplated lending activities typically encompasses both the private and public sectors. A large and active development bank, meshing developmental financing of private and public facilities at below-market interest rates could represent a significant subsidy to small borrowers. On the other hand, large scale intervention of a Federal financing authority could lead to a critical look at the underlying efficiency of building and operating facilities on a local as opposed to regional basis. This could generate greater pressure for planning, operating, and financing of public facilities and programs on a regional basis as a precondition for credit assistance. In any event, it is unlikely that a Federal bank with an excess demand for its low-cost loans would confine itself to simply accommodating small borrowers, whatever their spending priorities. It is the potential loss of local autonomy and for politicizing the lending process that presents the major political barrier to the idea of the national development bank.

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[28] See U.S. Congress, Joint Economic Committee, *The Economics of Federal Subsidy Programs* (Washington, 1971).

[29] EDA loans about $30 million annually and FmHA, about $700 million annually primarily for rural public facilities).

[30] See *Building A Broader Market*, Chapter 9, for a discussion of proposals for Federal assistance to the municipal bond market.

INTERGOVERNMENTAL REVENUES: CURRENT THEORETICAL AND POLICY ISSUES

[By James A. Wilde*]

Not so long ago Madison Avenue came up with the suggestion that while we were up, we should get a grant. Regardless of its impact on the liquor business, such a slogan surely has become increasingly important along Pennsylvania Avenue. This growing popularity and availability has been particularly significant in the relations between the Federal Government and various localities. In the past 15 years we have seen more than a 10-fold increase in grants-in-aid sent directly from Washington to the city and town halls, not counting those Federal funds which localities receive indirectly through their State governments (Table 1). When general revenue sharing funds are included, we find that intergovernmental revenue between Federal and local units is more than $10 billion higher in 1974–75 than in 1950–60, or more than a 17-fold increase. As of 1974–75, the local sector relied on this direct flow of Federal funds for about 7.5 percent of its general revenue.

TABLE 1.—INTERGOVERNMENTAL REVENUE FROM FEDERAL TO LOCAL GOVERNMENTS

[Dollars amounts in billions]

Item	1959-60	1964-65	1969-70	1974-75
Total local government revenue	$33.0	$47.5	$80.9	$146.3
Grants from Federal Government	$0.6	$1.2	$2.6	$6.7
General revenue sharing	0	0	0	$4.2
Federal intergovernmental revenue/total local general revenue (percent)	1.8	2.4	3.2	7.5

Source: Various census of Government publications.

It is important to note that the financial flows summarized in table 1 are only the most obvious forms of intergovernmental fiscal relationships which occur in our present Federal structure. The various governmental units influence each others' budgets in many other ways, including loans, tax sharing, tax credits, tax deductions, tax exclusions, tax exporting, benefit externalities, and of course through the very workings of our macroeconomic system. The variety of these influences is impressive, and yet grants and revenue-sharing stand out in this group not only because of their size but also because the flexibility and adaptability that they bring as solutions to problems of fiscal federalism. It is thus appropriate that these two prime techniques receive special attention at this Conference. Given that others on the program will be dealing with the revenue sharing dimension, I will concentrate most of my attention on aspects of grants-in-aid.

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The stake that small localities have in the Federal grant system is illustrated in table 2. It is clear that these small governments have not been receiving a *pro rata* share of the Federal aid, and moreover that this situation has existed for some time. The reasons for this aid pattern are no doubt many and varied. Some of these reasons will be discussed in some detail below to the extent that they relate to the design of assistance programs and to the economic situation of recipients. Other factors are much less tangible economically, including the energy and aggressiveness with which "grantsmanship" is performed in various jurisdictions. One of the news magazines last year carried the story of the "Midas touch" of the mayor of Kings Mountain, North Carolina (population 9,000), which had received $16 million in Federal aid during the mayor's 10 years in office. The almost $2,000 per capita in grant receipts clearly places that community in the tail of a distribution of funds within a given population bracket. We should be aware that such "horizontal differentials" among similarly-sized localities may be just as significant as the "vertical differentials" which are obvious in table 2.

TABLE 2.—INTERGOVERNMENTAL REVENUE OF MUNICIPALITIES AND TOWNSHIPS FROM FEDERAL GOVERNMENT—1962, 1967, 1972

[Per capita amounts in dollars]

	Municipality population size				
	1,000,000 and over	500,000 to 999,999	300,000 to 499,999	100,000 to 299,999	50,000 to 99,999
Year:					
1962	5.02	12.13	9.54	6.48	3.51
1967	14.87	23.94	14.86	9.72	7.90
1972	34.22	70.40	36.48	29.61	15.04

	Municipality population size					
	25,000 to 49,999	10,000 to 24,999	5,000 to 9,999	2,500 to 4,999	Less than 2,500	All municipalities
Year:						
1962	2.74	2.20	1.49	1.22	1.18	4.64
1967	5.14	3.62	2.85	2.36	1.96	9.21
1972	12.10	9.00	7.78	6.94	1.06	23.39

Sources: Census of Governments: Finances of Municipalities and Township Governments, 1962, 1967, 1972.

In discussing intergovernmental revenue programs, I shall begin with the expected responses of recipients to the availability of funds. This begins with a summary of the traditional household-type model and then moves to some interesting newer models of the decision mechanism. These results are then compared with the various empirical insights which have been obtained. The next section provides suggestions for different approaches in empirical studies. In the final section attention is focused on the issue of design of assistance programs by the donor.

The Standard Model

The standard model had its origins more than 20 years ago in the work of A. D. Scott (29). In its usual form, the model focuses on the recipient unit of government, or more explicitly on the legislative body making decisions for that jurisdiction. It posits a preference function for that legislature which has the same consistency properties as an individual's indifference map. The impact of any given grant scheme is then traced as the recipient's budget line shifts to reflect the conditions of the aid program. The key elements of this model are the assumed utility-maximization of legislatures, for whom only private and public goods provide value, and the premise that it is such a legislative body which will receive and respond to the aid. By focusing solely on the recipient, this framework becomes predominantly a positive one which ignores the interests and objectives of the donor.

Distinctions are drawn between alternative forms of aid to the extent that (1) the funds must be spent on specified public services, and (2) the recipient must provide a given amount of local funding to match outside grants. As a result, four types of aid are highlighted:

(1) Nonmatching grants for a specific function;

(2) General nonmatching grants, without limitations on functional use;

(3) Unlimited (or open-ended) specific matching grants; and

(4) Close-ended specific matching grants, where the donor places a limit on his financial contribution.

These alternative features are then contrasted in terms of possible differences in expenditure response. The results can be most clearly seen in figure 1, which assumes that the recipient government would have spent some positive amount on the function specifically aided even in the absence of outside assistance (point E_0 along initial budget line AA′). Responses in the case of zero no-grant expenditures can be described without further graphics.

Figure 1a shows one possible response pattern to the availability of non-matching aid specifically tied to a given function. Because of the categorical restrictions, the budget line shifts from the original AA′ to the kinked line ACB′. The new equilibrium point is E_1, indicating that the grant has served to increase spending in the category to which it was tied. However, because expenditures on all other goods also rise, some of the grant has effectively leaked away from the designated target. With the decline in local funding of the aided function, the grant has been only fractionally stimulative to total spending in the specified category. This fraction might be called the marginal propensity to spend on the aided function.

One important comparison with this case is the expected response to nonmatching aid whose use is not specifically designated—or in other words the general revenue-sharing case. In the absence of expenditure restrictions the budget line for an equal dollar amount of assistance shifts to BB' in figure 1a. The new equilibrium is once again at E_1, indicating the *possible* equivalence in outcomes of the two types of aid, each of which has only an income effect on the recipient. The key result is the evidence of the fungibility of aid, which donors should be aware of as they ponder categorical restrictions.

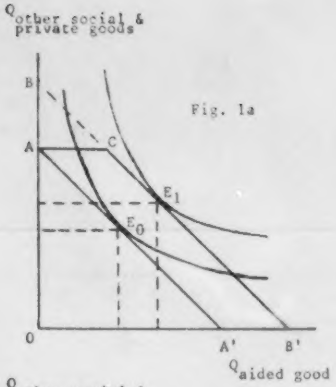

Fig. 1a

Q other social & private goods
B
A
C
E1
E0
0
A'
B'
Q aided good

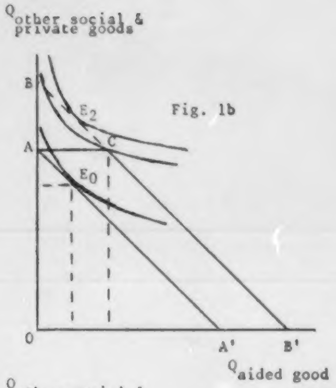

Fig. 1b

Q other social & private goods
B
A
E2
C
E0
0
A'
B'
Q aided good

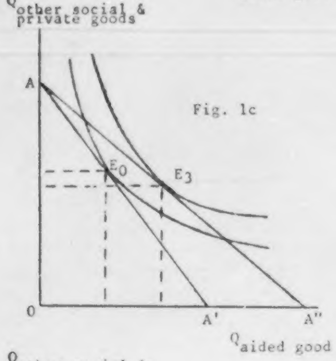

Fig. 1c

Q other social & private goods
A
E0
E3
0
A'
A"
Q aided good

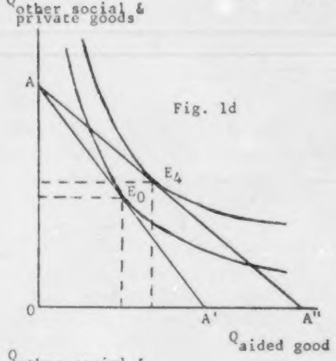

Fig. 1d

Q other social & private goods
A
E4
E0
0
A'
A"
Q aided good

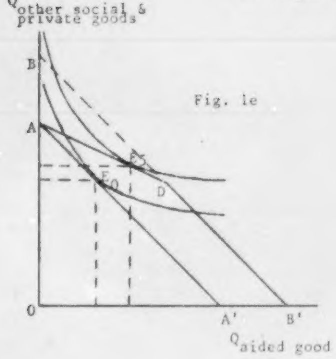

Fig. 1e

Q other social & private goods
B
A
E5
E0
D
0
A'
B'
Q aided good

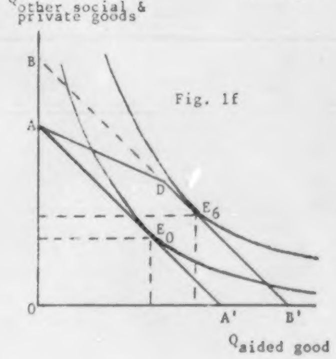

Fig. 1f

Q other social & private goods
B
A
D
E6
E0
0
A'
B'
Q aided good

That the above equivalence in results is not necessary is demonstrated in figure 1b. The specific non-matching grant is again shown by line *ACB'*. The equilibrium is the corner solution at point *C*, rather than the tangency point E_2, which would result from equal revenue sharing along *BB'*. While general aid continues to have only an income effect, the functional restrictions have resulted in higher spending for the specified service. Nonetheless local funding of the aided function has been reduced to zero at point C, indicating that specific aid has been once again only fractionally stimulative to total spending on the aided function (though the fraction would be greater than the marginal propensity to spend on it).

Should the recipient government not have spent anything on the aided function in the pre-grant situation (initial equilibrium at point A), we are clearly in the figure 1b type of case with a corner solution. Since there is no initial local funding of the aided function, and the equal revenue sharing result could be at point B, leakage of grant money away from the aided function will be reduced considerably, if not eliminated. Where the donor gets the recipient government to undertake its first activities in some area, the stimulative effect could be as much as 100 percent of the aid given.

Two types of reaction to open-ended matching grants are indicated in figures 1c and 1d. In either situation, the donor offers to underwrite a given proportion of the expenditures on a specified function and places no dollar ceiling on that contribution. The price-reduction impact of such aid should increase total expenditures on the aided function. Whether this increase is more than the amount of the grant, as in figure 1c where local funding increases, or less than the grant, as in figure 1d where local funding declines, is simply based on the price-elasticity of the legislature's demand for the service in question. The largest rate of stimulus would result in the case of no pre-grant program since the added expenditures would be the total spending of G/m, where G is the dollar amount of aid and m is the fraction of the program centrally funded. The key contrast between matching and non-matching aid in this standard model is the former's possibility of stimulating total expenditures on the specified function by more than the amount of the grant.

Since matching aid is more often then not limited to a dollar ceiling by the donor, the closed-ended type of program depicted in figures 1e and 1f is of considerable importance. If the recipient chooses not to take advantage of the full amount of assistance offered, equilibrium will occur along the AD portion of budget line ADB′ in figure 1e, where point D represents the aid ceiling. In this case, the stimulative impact is exactly the same as described above for unlimited matching. Should the recipient decide to extend spending beyond the point of eligible matching, figure 1f shows that the outcome is equivalent to the revenue sharing case, with its fractional stimulus. If there were no pre-grant expenditures, the spending increase would have to be G/m because the figure 1f case of pure income effect from closed-ended matchings is apparently precluded. These graphs should make abundantly clear the importance of determining whether or not ceiling has been an effective constraint in closed-ended matching programs.

The standard model thus highlights three important characteristics which must be kept in mind in any comparison of alternative grant formulas: (1) the relevance of specifying an aided function; (2) the variety of price effect possibilities; and (3) the impact of aid ceilings in grant opportunities. Given the range of possible responses which these characteristics imply, discussions of grant results and aid design must be cognizant of such model analytics.

And yet the validity of these generalizations has been questioned by those who consider the standard model naive and idealistic as a description of public sector activities. The search for an alternative model has been slowed by the predominant attention in public finance theory given to analyses of social goods in a Musgrave-Samuelson framework and to median voter models. In all of these, the supply side of the question has been obscured if not ignored. The standard approach above rather glibly assumed that the cost of aided activities was given and moreover unaffected by grant opportunities. This imbalance in focus is reversed in the following sections, which explore the possible impact of intergovernmental revenue through supply-oriented models.

Aid in a Niskanen Model

The work of William Niskanen, most clearly shown in his *Bureaucracy and Representative Government* (24), has been influential in drawing economists' attention to the supply side of public expenditure analysis. By focusing on the possible role of bureaucrats in the decision process, he provides an alternative to the easy assumption of quasi-competitive supply. The central feature of the Niskanen model is the assumption that brueaucrats not only attempt to maximize their budgets but are in such a monopolistic position that they are able to capture the consumer surplus from the demanders of public goods.

In graphical terms, this assumption entails the transformation of the traditional demand curve DD′ into a marginal revenue curve, as shown in figure 2a, and the construction of a revised average revenue curve. The search for the maximum budget is constrained by the presumed necessity of keeping spending within appropriations. The result is an optimal point for bureaucrats at Q, with the no-deficit constraint being effective.

This AC=AR equilibrium is but one of two possibilities described by Niskanen. His second case covers situations in which the average cost curve intersects the revised average revenue curve to the right of D′, the point at which the traditional demand curve meets the quantity axis. Since D′ represents the maximum revenue of appropriation for a surplus-capturing bureaucracy, the budget-balancing constraint is no longer binding in budget determination. Because the difference between AC and AR at output D′ cannot be distributed as profits, unnecessary costs are incurred in order to use up all appropriations. This case of bureaucratic inefficiency is one of Niskanen's more interesting results, but it is also rather unconvincing in that it depends on a demand curve which intersects the quantity axis. If demand curves are more likely to approach the axis asymptotically rather than intersect, the AC=AR equilibrium of the first case seems decidedly more plausible. The remainder of this section thus deals with Niskanen's budget-constrained case.

This model leads to the conclusion that bureaucratic participation in the budget-setting process causes over-supply of public goods, a result which critically depends on the ability of bureaucrats to capture consumer surplus. The goal of budget-maximization has a plausibility similar to Baumol's sales-maximization even though monetary rewards from sponsors seem more difficult to achieve in the public sector (3). Somewhat harder to accept is the premise that bilateral negotiations between bureaucrats and legislative sponsors would

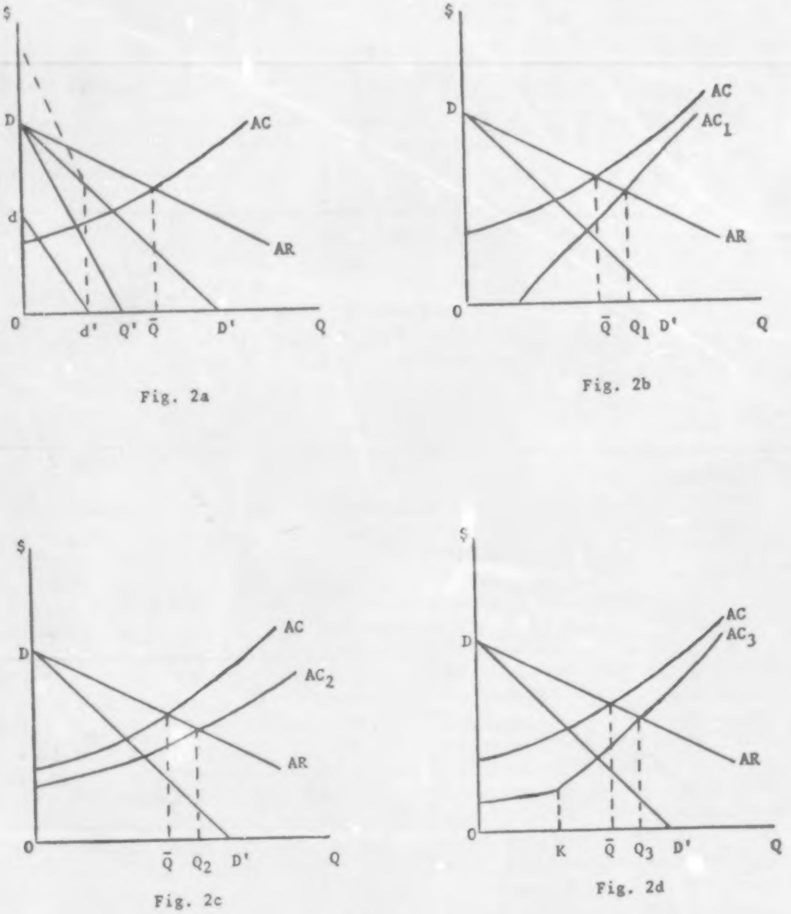

Fig. 2a

Fig. 2b

Fig. 2c

Fig. 2d

FIGURE 2

result in a one-sided capture of consumer surplus, as Hettich (14) has suggested. In relating this issue to the focus of this conference, one is led to speculate whether the necessary monopoly in public service supply is more or less likely to exist for functions traditionally provided by local governments than for the functions of State and national units. Three bits of casual observation would seem to suggest less bureaucratic dominance at the local level. The Tiebout hypothesis (31) concerning residential location predicts some degree of inter-locality competition, which would undercut the bureaucratic power posited by Niskanen. Secondly, we can observe that such typically local services as education, recreation, transportation, and health have significant private market alternatives. In either case, the existence of cost-minimizing competitors would be capable of reining in the monopolistic inclinations of bureaucrats in the same fashion that profit-maximizers could discipline sales-maximizers. A third observation would be the "rule" that the public can most easily control the government that is closest to home. These views may be strengthened or undercut by further insights into the relative openness of large communities versus the small localities, on which this conference is focusing. In any case we await some empirical tests of the basic Niskanen model.

Of more direct relevance to this section is the impact of grants-in-aid in a budget-maximizing bureaucracy. Such a subject is not addressed in Niskanen's book, though he may have had something similar in mind in the description of a "mixed bureau" (24, chapter 10). The latter is defined as one which "receives part of its financing from (appropriations) and part from the sale of a service." If the demand for the marketed service is represented by dd′ in figure 2a, the two separate demands can be added vertically to obtain the kinked average revenue curve.[1] The result of adding in a market demand for government services depends on the juxtaposition of AC with the kinked AR curve. In figure 2a, the budget remains unchanged at $\bar{Q}$ with no resulting market sales.

While it is reasonable to view grants-in-aid as a reflection of a separate demand, the above method of reflecting such funding is not convincing. Two alternative interpretations of intergovernmental aid in a Niskanen model seem more plausible. The first of these follows the spirit of Bradford and Oates (4, 5) and views grants as if they had been meted out among the citizenry. Depending on the type of grant, each voter would view his budget line as shifting because of his share of the aid in exactly the same fashion depicted in our earlier model, where recipient governments were viewed as acting as if they were individuals. If the sponsor's demand curve DD′ accurately reflected voter demands, the response to the availability of aid would be a shift in DD′ identical to that predicted by the earlier model. Surplus-capturing bureaucrats would then be confronted with a new adjusted average revenue curve for each grant type and would be able to generate quantitatively larger expenditure responses, although the relative stimuli among grant types would appear to be unchanged. The major difficulty with this interpretation of the Niskanen model is that it posits considerable knowledge of the aid situation on the part of voters or sponsoring lawmakers or both, an element which seems contrary to the one-sidedness of information inherent in the basic Niskanen model.

A second possible interpretation not only views the grants as being made to the bureaucracy rather than to the citizens or sponsors, but also looks at aid as a subsidy to costs rather than to demand or output.[2] This entails a different shift in the AC curve for each alternative type of grant scheme, with DD′ and AR remaining unchanged in each case. The various possibilities are illustrated in figure 2.

In the case of specific non-matching aid, the net (aid adjusted) average cost curve AC_1 will asymptotically approach AC from below as output expands. This creates a new equilibrium at Q_1 in figure 2b.

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[1] See Hettich (*14*). It is assumed that the bureau is unable to capture consumer surplus in the market. If we are considering the grant donor's external interest in local services as analogous to this market demand, we might be able to reconsider this surplus-capturing assumption.

[2] McGuire (*17*) has discussed the issue of cost versus performance subsidies. With output measurement still presenting a formidable obstacle to performance grants, we shall focus only on those related to costs.

In moving from $\bar{Q}$ to Q_1, the bureaucracy has been able to divert increased appropriations into the aided function (as we move down along AR) as well as retain all of the grant in that same area. In such circumstances spending on the designated program will rise by more than the dollar amount of aid, a result far different from that obtained in the standard model.[3]

An open-ended matching grant will shift the cost curve down in the manner shown in figure 2c, while one with an effective dollar limitation (represented by point K) is illustrated in figure 2d. For both types of matching aid, the result is higher aided-function expenditures enhanced by absorption of further consumption surplus. With this type of reaction mechanism, the donor government never has to be concerned that an inelastic demand in the recipient locality might significantly erode the grant stimulus. An increase in the matching rate will cost the donor more money but will always increase the local funding, the size of this increase being related to the demand elasticity. As before, an effective ceiling on the matching turns the grant into the non-matching case.

It is difficult to analyze general non-matching aid or revenue sharing in this Niskanen-type framework since the funds would be sent to a governmental unit composed of many separate bureaucracies. Which bureaus would be able to obtain portions of these funds as cost subsidies cannot be determined in this model. However, since some amount of sharing is probable, we can no longer say that general aid will have the same functional impact as many types of specific non-matching or closed-ended matching grants. Nor could taxpayers expect any tax reductions from a revenue sharing program. One other conclusion from the standard model needs to be changed in this framework: no longer can a given amount of aid have a different functional stimulus depending on the form used because bureaucrats are assumed to view any amount of aid as an identical cost subsidy, with the same effect on AC in all cases.

Variations on the Theme

The contrast in approaches between the standard model and the Niskanen model is clear-cut. In the former it is the citizenry of the legislature which is the actor-reactor, while in the latter case the focus is on the bureaucracy-supplier. The identity of the actual recipient of the assistance funds becomes vital. It is entirely possible that the choice of models to analyze grant impacts has been influenced by philosophical principles. Those who focus on the demand side may do so because they believe that citizens (or some segment thereof) are the intended ultimate beneficiaries of such programs. On the other hand attention to the supply side may stem from a belief that government serves to frustrate the will and interests of the constituency.

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[3] In Niskanen's budget-constrained case, where the equilibrium is initially at D′ (viewed earlier as unrealistic), the cost-subsidizing grant will not serve to change the supplied amount of the aided function. The expenditures on the public service in question would rise by the amount of the grant in the form of completely wasteful (unproductive) outlays. If these outlays are for bureaucratic perquisites, it is easy to understand a search for grants by the bureaucracy. However it seems equally plausible to imagine public or sponsor outrage at finding out that a grant receipt has neither expanded (improved) services nor freed resources for other uses. Should this outrage result in greater scrutiny of the bureaucracy, the latter's monopolistic control would surely be undermined. Thus, a bureaucracy initially at D′ may simply elect to ignore all grant opportunities. This might be equally true for other forms of aid.

Perhaps because the Niskanen model is newer and because the supply side has received a smaller share of economists' attention, some modifications are worth probing. These will center around two fundamental aspects—the monopolistic power of the bureaucracy and its motivation. Variation One maintains the premise that bureaucrats seek to maximize their budgets but denies to them the power to capture consumer surplus. With the original DD′ curve in figure 2a becoming the locus of possible equilibrium points, the point of unitary price-elasticity Q′ becomes the goal. Such a point becomes the equilibrium unless the AC curve intersects DD′ to the left of Q′. If aid is once again viewed as a cost-subsidy rather than a demand subsidy, the new average cost curves take the same forms shown in the various sections of figure 2. Remember that the expenditure stimulus occurs for an initial equilibrium to the left of Q′ and a post-grant intersection of DD′ and AC_1 at or the left of Q′. Here the spending rises because of the aid and greater local tax support, both of which contribute to higher output.

The smallest expenditure stimulus under Variation One would occur with an initial equilibrium at Q′, regardless of the type of matching provisions that are attached to the aid. The recipient of such funds clearly has no incentive to expand output if aid is fixed in dollar amount and marginal local tax revenue becomes negative with higher social good quantities. Thus the bureaucracy uses the grant to add wasteful spending on unproductive inputs. Spending on the aided function would increase only by the amount of the grant. and any such increase would represent a zero real output gain.[4] Even if donor matching is available beyond Q′, the bureaucracy finds that the local tax revenue which is used to match such aid hits its maximum at Q′, thereby precluding higher output and causing wasteful use of grants.

The greatest possible stimulus to spending once again occurs when the recipient made no expenditures prior to the aid program. In this case, the spending total is attributable to the grant. The budget-maximizing bureaucracy will provide the same response to the two varieties of matching aid as would occur under either the standard or the Niskanen model. However, the bureaucracy may be able to begin local funding of the specified category along side non-matching aid, something that the standard model would not permit.

Variation Two removes the monopolistic control from the bureaucracy and institutes cost-minimization and average-cost pricing. If grants once again serve as cost subsidies, the only deviation from Variation One results occur for intersections of demand and average cost curves to the right of Q′ in figure 2a, the point of unitary price-elasticity of demand. The average-cost pricing bureaucracy can be in equilibrium in this range of outputs beyond Q′, thus permitting grant funds to leak into other uses as local funding of the designated function is reduced. Thus, for the first time in the three supply-cost models, we find the possibility of an increase in total spending which is less than the amount of the aid received. As was the case with the Niskanen model, both Variations seem incapable of predicting the functional use of revenue sharing funds, though once again they are unlikely to result in tax cuts.

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[4] It is conceivable that there may be some mutual back-scratching among bureaucracies in the sense that aid funds could be effectively diverted to other agencies rather than used to add "fat" to the recipient bureau's budget. However, since this is in conflict with short-run budget-maximization, this possibility will be ignored for the present.

Table 3 summarizes the comparative implications of these four models for recipient government spending. For each model the maximum expenditure stimulus occurs when there is no pre-grant program. Under such circumstances it is interesting to note that matching grants under all four models provide the same stimulus per dollar of aid, namely the reciprocal of the matching rate. Thus donors who are looking for the "biggest bang for the buck" might very well lean in the direction of innovative assistance. Aid to these same areas, however, is also apt to provoke the cries of "distortion" from recipients, who see the need to raise local funds and to create new, possibly competing, bureaucracies. In the absence of pre-grant spending, the standard model is almost certain to result in a smaller program than the other models, since the latter's interpretation of aid as a cost subsidy injects a price effect which is absent under the household-type approach.

TABLE 3.—RANGES OF SPENDING RESPONSES TO ALTERNATIVE AID TYPES WITH ALTERNATIVE MODELS

Aid type and model type	Standard model		Variation 2: Average cost pricing		Variation 1: Simple budget—maximizing		Budget—constrained Niskanen model	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Specific nonmatching aid for service x	$\Delta E=G$	$\Delta E=aG$	$\Delta E=b_1G$	$\Delta E=b_3G$	$\Delta E=b_2G$	$\Delta E=G$ [1]	$\Delta E=b_2G$	$\Delta E=b_1G$
General nonmatching aid (revenue-sharing).	$\Delta E=aG$	$\Delta E=aG$	(?)	(?)	(?)	(?)	(?)	(?)
Specific matching aid for x with ceiling	$\Delta E=G/m$	$\Delta E=aG$	$\Delta E=G/m$	$\Delta E=b_1G$	$\Delta E=G/m$	$\Delta E=G$ [1]	$\Delta E=G/m$	$\Delta E=b_4G$
Open-ended matching aid for x	$\Delta E=G/m$	$\Delta E=b_1G$	$\Delta E=G/m$	$\Delta E=b_1G$	$\Delta E=G/m$	$\Delta E=G$ [1]	$\Delta E=G/m$	$\Delta E=b_5G$

[1] Inefficient spending likely.

Note: Where: G=grant funds; E=total spending on specified function=local funds+G; a=marginal propensity to spend on aided function (<1); m=matching rate=G/E within the matching range; $0\leq b_1\leq 1/m$; at price-elasticity of demand=1, $b=1$; $1\leq b_2=E/G$; $0\leq b_3\leq b_2$; $1<b_4\leq b_2$; $1<b_5\leq 1/m$.

The dissimilarities among models is highlighted in the minimum stimulus indications of table 3. These differences are largely attributable to the following characteristics:

(1) The price effect orientation of bureaucracy-centered models, even in non-matching cases;
(2) The certain ability of a Niskanen bureaucracy to absorb increased local funds in the face of grant opportunities;
(3) The ability of budget-maximizers to avoid the loss of local funding; and
(4) The possible elimination of the price effect from matching aid where ceilings on available funds are effective.

Empirical Results

The summary results of table 3 are important for understanding and evaluating the outcomes of the many empirical studies which have either focused on or included intergovernmental revenue. Gramlich (11) has provided an excellent analysis of many of these studies along side an abbreviated form of table 3, which utilized only the standard model. In comparing empirical results with this model, he interpreted many studies as implicitly finding considerable complementarity between functional areas since many aid coefficients were greater than the standard model would predict. Complications of aggregation played a considerable role in this interpretation. First, an average matching rate benchmark was chosen rather than one utilizing the precise rates of programs under consideration. Secondly, such complementarity could show up because regressions were run over broad categories of expenditures rather than for the aided-programs alone.

However, table 3 provides us with plausible alternative interpretations to complementary (about which we have little additional empirical confirmation). The three additional models outlined above provide a rationalization for larger regression coefficients than the standard model permitted. Indeed one might hope that the empirical studies could tell us something about how governments behave—just as there was hope for empirical insights into the operational rules of such firms from the corporate income tax studies. Unfortunately, there is such extensive overlap in the ranges of possible results shown in table 3 that insights of this sort are not possible.

The above rationalization of large regression coefficients should not be taken as a signal that we can overlook potential or actual statistical biases in much of the existing empirical work. As Gramlich and others have correctly pointed out, an upward bias to empirical results has been built into the form of many regression models. While some improvement has been seen in the recent work of Inman (16) and Gramlich and Galper (12), it must be re-emphasized that aid truly of the matching variety should be analyzed through its price effect rather than simply as a dollar flow. Besides using some form of the matching rate as an independent variable, we must be aware of those circumstances in which the matching rate itself is a function of other variables, such as income, which will presumably have their own separate impact on local spending regardless of the theoretical model presumed. These are certainly not new insights, but ones which need to be periodically re-emphasized.

A further critical aspect of empirical design is the amount of aggregation which occurs. Excessive aggregation is done not only over units of government but also over functional areas. There has been increasing concern expressed for the narrowness with which aided functions are specified. Without debating at this point whether such specification is truly in line with donor interests, I think it is safe to say that we will not get a true understanding of the narrow stimulus if that function is combined with others somewhat related to it under broad headings such as health, transportation, and welfare. Surely the potential leakages of income effects will blur the results as they relate to the narrow function which is aided. We have done little research into intergovernmental programs on a grant-by-grant basis.

The tendency to aggregate over all local governments or over combined State and local governments is similarly discouraging to accurate insights. The very balkanization of the local sector, due in part to heterogeneity of the population, strongly suggests that aggregation over governmental units will obscure the variety of responses likely to occur between those dissimilar units. It seems important to select as the unit of observation that jurisdiction making the decisions. Such a guideline often cannot be implemented without some care.

Let me illustrate this with two cases: The public assistance program, operating primarily through A.F.D.C., in a number of States is a tri-level program in terms of its financing. After the Federal share is received, the State government dictates to its counties what portion of the remaining funds must come from them. On its face this may appear to be Federal-and-State aid to local governments, with the latter being the ultimate responding jurisdiction. However, it is also true that Federal law requires that public assistance programs be essentially uniform Statewide, which implies that the State government has ultimate authority over the design of public assistance. If this is true, then public assistance is actually a Federal-and-local aid program for State governments. Suppose the Federal financial share is 60 percent and the dictated local burden is 25 percent of the non-Federal funds. Under the first interpretation of public assistance, the correct observation unit is county government and the correct matching rate 90 percent. If the second view is taken, we should examine the State-wide program and use a 70 percent matching rate (although significantly 10 of the latter percentage points of matching come totally from within the State, rather than being "outside" aid).

A second example derives from the fact that we rather glibly attach the label of "local government" to more than 75,000 rather disparate units. In North Carolina, public education is funded with Federal and State aid along with a combination of county-wide taxes and school district taxes. Suppose that there are two separate school districts within a county (call them simply urban and rural) receiving equal per-pupil funds from the county government. How much county-wide funding exists is of considerable importance. Under a self-interest assumption there is an incentive for the poorer (assume rural) school district to push for higher county funding, while the wealthier school district has an interest in lower funding (to minimize the sharing of its wealth). If the political-economic calculus is such that the poorer district dominates county decisions, one could view county-wide economic characteristics as being better predictors of expenditure response for the poorer district than its own characteristics. It is not entirely clear whether county funds should then be viewed as external or internal. A further complication here is that county commissioners have a veto power over proposed district tax supplements; and county boards have been known to reject district tax proposals which would create overly large spending differentials relative to neighbors. Thus the subject of governmental organization, which will receive further attention later in this conference, needs to be fully considered in designing empirical studies of intergovernmental aid.

Three additional aspects are worthy of note in the design and interpretation of empirical work. The first of these is the value of identifying where grants serve to introduce new types of spending into the recipient's budget. It is likely that the typical cross-sectional empirical approach is not well-suited for this task and the time series studies will give a better picture of the dynamic effects. Secondly, it should prove fruitful for studies to identify and analyze those grants which are not general cost subsidies but rather underwrite the costs of only certain types of inputs. Several writers have discussed this type of grant (27, 28, 32) and the inefficiencies it can create where factors are substitutable. Studies focusing solely on expenditure impact without paying attention to output implications will not serve to uncover potential inefficiencies of this type. A third improvement would entail the differentiation of formula grants from project grants, where the latter require an application-and-approval process and the former do not. Not only are these two types likely to involve different red tape and administrative costs, but projects are apt to be associated with more controllable types of functions and a different degree of aid fungibility. Since formula aid is quite universal in distribution, while project aid is not, the reasons behind the distribution patterns for project aid are of interest. It is entirely possible that project aid is an endogenous rather than exogenous variable and can be explained in part by a variety of political, social, and economic factors. One further complication with project grants is the ambiguity of the matching ceiling. There may be no explicitly stated maximum amount in the program, and yet the donor in approving an application places a precise lid on his contribution. If grant approval is given for the full request, does this mean that the donor might not be interested in assisting an even more extensive project? When the application was made, did the potential recipient play gamesmanship in guessing what might be approved, turned down, or scaled down? A more detailed grant-by-grant analysis could provide valuable insights on these matters.

Donor Interests and Appropriate Grant Structures

Our attention thus far has focused primarily on the possible reactions of grant recipients. The conflict of interests in the design of aid programs has become well established in the public finance literature (34). This conflict relates not only to the matter of specification of the aided function but also to the "incrementalist interest" of the donor. The latter shows up directly in a formula which only provides assistance beyond particular quantity levels or after given local efforts have been made, or alternatively in an unwillingness to give financial help to jurisdictions providing a priority service on their own. In this respect, the donor is caught up in the conflicting tugs of equity and efficiency. As a focus on the national interest (and thus responsible for considering overall allocative efficiency), the donor should be willing to help fund all such activities which provide positive marginal benefit to the nation. This inclination may be constrained by budget limitations that effectively divert attention to those localities which have not themselves spent money and where marginal national benefits may be greatest.

Alternatively the donor's view of efficiency may be one of obtaining the largest expenditure increase from the recipients. In such a case, assistance given to recipients with inelastic demands can only be viewed as wasteful, even if the matching formula faithfully reflects true national interests. The dilemma arises because of an apparent unwillingness to accept the fairness financing implications of the benefit approach to allocative efficiency. While the Buchanan argument (7) concerning the indeterminacy of inframarginal financing of social goods is well taken in a strict sense, it takes no great leap of faith to extend marginal efficiency norms to average equity standards. Thus where the national interest is identical, the grant provisions should be similarly identical, even though the expected response rates are different, if the aid program is to be even-handed and fair.

This means that if the Federal Government wishes in the interests of fairness to assume some basic availability of a given service nationwide, it should pay the respective providing governments the necessary funds to do so through a specific non-matching grant. That some recipients would have provided such levels on their own and are therefore likely (under the assumptions of the standard model) to divert this aid to other uses is no reason to redesign the assistance. That result is both efficient and fair. Unfortunately it may also be expensive to the donor (though not to society), and that is the prime reason that interests of this sort are poorly reflected in aid design.

Similar types of problems arise with so-called equalization grants, which take the recipients' varying fiscal capacities into account in the grant formula (1). Quite apart from the difficulty of measuring fiscal capacity, if the equalizing formula is successful in achieving equal spending outcomes, it has done so by granting more Federal funds to the poorer localities. In such cases equalizing aid can properly be viewed as redistributional. The redistribution is unfortunately intergovernmental in operation and therefore likely to be a rather crude means of carrying out equity norms which are largely interpersonal in nature. Since jurisdictional populations are heterogeneous, nonpoor people are aided when we send grants to poor governments.

The problems and dilemmas which arise in grant design are simply one more example of the difficulty of trying to kill two birds with one stone. A single intergovernmental revenue program is unlikely to be successful at both equity and efficiency objectives. Thurow (30) and others have amply warned us of the necessity of linking objectives with instruments. And not having paid much attention, we end up years later passing a revenue-sharing bill which includes a tax-effort dimension in the formula. The matching rate effect of the tax-effort provision must be disheartening to those governments which are unwilling or unable to expand their spending activities.

The Relevance for Small Local Governments

What do the data of table 2 and the above analysis mean for small local governments? A first observation would be a word of caution in interpreting table 2. The amount of Federal assistance "available" to residents of small municipalities will in many cases be larger than that shown to the extent that they utilize services provided by neighboring towns, and by their own or nearby counties. The area hospital would be just one example of such a situation. The extent of the distortion in table 2 figures caused by such factors is unknown, but its removal is unlikely to eliminate the "pro-big bias".

To the extent that towns with small populations are non-rural and less dense, the interdependence-interaction factor cited in many longitudinal as well as cross-sectional studies in public finance would surely be weaker. With a smaller public sector relative to income, towns would be less involved in or interested in activities the Federal Government typically assists. Public sector economies of scale undoubtedly play a role in the Federal aid distribution picture. A small unit of government may simply not find it feasible to hire a full-time grantsman, if such is needed to take advantage of all project aid application possibilities. The types of cost studies done by Hirsch

(15) and others, about which we shall hear more later on, suggest that small localities (those under 10,000 population) do not come near taking full advantage of the scale economies of many public services. If the higher per-unit cost results in a smaller public sector, once again there is less inclination for requesting Federal assistance.

These economic tendencies may be reinforced by socio-political ones, including the alleged conservatism and independence of small town residents who might rather solve problems on their own than rely on Washington. Other more explicit political impacts show up in the lack of home rule for localities, which limits the types of functions undertaken, the types of taxes levied, the level of tax rates, and the amount of debt financing—and thus may limit the ability to attract Federal funding. My intuitive feeling is that limitations are likely to be more restrictive for larger localities than for smaller ones, though I don't recall any evidence of such tendencies. Probably more important than these are the explicit statutory or administrative limitations on Federal aid eligibility. Within the last 6 months alone, the town of Chapel Hill found that it was unable to receive Federal assistance for bikeways or for transit system operating deficits merely because the population was less than 50,000. The inequity of such restrictions is obvious unless one believes that bikeways in large towns and cities are in the national interest while those in small towns are not. The absence of any direct knowledge or evidence of what is in the national interest makes it difficult to establish the case one way or another. Even where such size limitations are not present, it is possible that the specification of aided-functions has been done more for redistributional reasons than for allocative ones. Could it be that Federal aid to mass transit is a vehicle for funneling funds to urban residents rather than for improving transportation facilities? That cannot be answered without knowledge of the true national preferences for mass transit; *i.e.*, is it a national social good?

While awaiting answers to these questions, small localities can ponder the advantages and disadvantages of cooperation and consolidation with other governmental units. Federal aid programs increasingly require consultation and approval of regional boards or councils of government. Although such regulations do not impose consolidations of activities on the local sector, they at least open up the opportunities of exploring such issues. The response to this exploration will help to determine how influential the Federal government will be in shaping the design of the public sector through its various intergovernmental revenue programs.

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REVENUE SHARING AND RURAL LOCAL GOVERNMENT: A NEW LOOK AT PRIORITIES

[By William O. Farber*]

A cliché story making its second or third round relates to a couple of men who meet on a street corner. One says to the other, "How's your wife?" To which the reply is given, "Relative to what?"

An evaluation of fiscal resources, the subject of today's session, of necessity involves the question "Relative to what?" Obvious tests come to mind: for example, fiscal resources might be measured relative to needs, or present resources related to past resources, or resources related to potential tax-paying capacity, or rural resources relative to metropolitan resources, or resources relative to non-fiscal as well as fiscal demands. Further, the character of the distribution of resources among governmental functions has pertinency.

As I considered the long list of possible areas of investigation relating to our subject matter, examine the list of experts on this as well as other panels, and knowing that we would have had major papers by Frederick Stocker and James Wilde, the contribution it seemed that I might best make would be an evaluation of the general revenue sharing from a sort of "worm's eye" point of view, utilizing my own research on the South Dakota experience. This seems especially appropriate in the light of the topics of the two subsequent participants on this panel.

A NOTE ON METHODOLOGY

I first ascertained the extent of research on revenue sharing as applied to local government. I must say I was surprised at the quantity. I made use of Metro, the computer bibliographic service with its some thirty indices. Using key words; "revenue sharing" and "local government" for the period since 1970, the International Search Service alone yielded 47 references, the National Technical Information Service another 40, and the Congressional Information Service listed 222 pages of references.

I have found especially helpful, as background material, the following:

(1) Advisory Commission on Intergovernmental Relations (ACIR), *General Revenue Sharing: an ACIR re-evaluation* (October, 1974).

(2) U.S. General Accounting Office (GAO), *Revenue Sharing and Local Government Modernization* (April 17, 1975, with papers by Daniel J. Elazar, Victor Jones, Ted Kolderie, Thomas P. Murphy, and Friedrich J. Grasberger).

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(3) GAO, *Revenue Sharing Fund Impact on Midwestern Townships and New England Counties* (April 22, 1976).
(4) *The New Federalism* (a conference of the Woodrow Wilson International Center for Scholars, 1973).
(5) Richard Nathan *et al.*, *Monitoring Revenue Sharing* (Brookings Institution, 1975).

The above, plus the extensive congressional hearings, special GAO reports, Office of Revenue Sharing materials, as well as the myriad shorter studies mean that this area has not avoided the paper explosion. But with this possible note of caution, in my opinion the quality of research and data, while good and mostly on target, has left much analysis to be done. What I have tried to do, in this presentation, is to present some observations on the prevailing conventional wisdom utilizing the South Dakota evidence.

THE SOUTH DAKOTA SITUATION

South Dakota is one of the most rural states of the nation, and all the customary advantages and disadvantages of rurality are magnified in this State. The Office of Revenue Sharing's *Initial Data Elements, Entitlement Period 7*, lists South Dakota with an urban population of only 76,000 (pages 439). Only North Dakota has a lesser number. But North Dakota has a per capita income $813 higher in 1975 than South Dakota. Among the States, only Maine, New Mexico, Alabama, Arkansas, South Carolina, and Mississippi had a lesser percent of the national per capita income in 1975.

With 66 counties, 1,031 townships, and 310 municipalities, government in South Dakota is fragmented indeed, and while it is not the most governed State in the union on a per capita basis, it is close to having that honor. Eighty percent of its municipalities have less than 1,000 inhabitants. Only New Hampshire's per capita support of State government is less. In 1974, South Dakota's State government received $242 per capita compared with $352 national average. See Table F-10, National Education Association (NEA) *Rankings of the States, 1976*.

The task of meeting public needs has had to be assumed by local governments. Thus, while South Dakota ranked 49th in per capita State tax revenues, the rank for local tax collections (1973-74) was 13th and above the national average. This has created a heavy reliance on the property tax where South Dakota ranks sixth in the percent of total State and local tax revenues from this source.

Without expanding the almost self-evident, I would like to quote a native son, Professor Robert F. Steadman, of Syracuse University, who summarized at a conference in Pierre in 1967: "Nowhere in this country have State and local governments kept pace with or adapted themselves fully to the revolutionary events in agriculture, in transportation, in industry, and in every other aspect of the social order. In all candor, moreover, it must be said that the local and State governments of South Dakota have been even less responsive to the challenges of change than has been true in many parts of the United States." Thus, South Dakota epitomizes or perhaps better, maximizes many of the worst problems confronting rural government in terms of resources and organization.

REVENUE SHARING: FISCAL IMPACTS

What have been the fiscal impacts on government in South Dakota? It is important to stress again the smallness of the jurisdictions. With a State of only 666,257 people in 66 counties (14 of them with less than 10,000 population, and 80 percent of the incorporated municipalities with less than 1,000 population), one is indeed dealing with small government.

The potential fiscal impact of Federal revenue sharing on these governments was and is great. Appendix A reveals that on an average, additional resources equal to almost 30 percent of tax collections would be available to the counties. Appendix B shows the lesser and more variable impact on municipalities. With townships, the relative amounts were considerably less (see appendix C).

The table below shows what has happened on the county level in South Dakota since 1972:

	1972	1975
County property taxes	$31,182,957	$38,086,534
County revenue sharing	9,265,273	10,895,509
Percent	(29.7)	(28.6)
County expenditures (total)	47,937,021	63,398,929
Highways	22,062,585	25,240,911
Courts and law enforcement	4,584,548	7,798,959
Care of poor	1,806,439	1,487,398
Mentally handicapped	776,483	879,205

Significantly, revenue sharing has not prevented a growth in tax take in the counties even though the need for such an increase might be questioned in view of the favorable financial position of South Dakota counties. A recent study showed that despite the smallness of the counties, the median county had $450,000 on interest in addition to case reserves and, in 1974, only eight counties had any debt whatsoever—less than $3 million, all of it for buildings. See Dan Crippen, "Managing County Money: The Cash Flow Problem", *Public Affairs*, USD, Vermillion, May, 1975.

In 1974, the 1,031 townships had a combined debt of only $155,150 while 148 municipalities were in debt for a total of $26,220,777. The municipalities with little shared revenue are clearly the general purpose units of government most in need. The breakdown of general revenue funds distributed through April 7, 1975, show how this need has not been met:

State	$27,940,838
Counties	32,593,747
Municipalities	17,320,150
Townships	4,024,127
Indian tribal governments	1,920,825

To evaluate the impacts of general revenue sharing in South Dakota, the further data elements that need to be fed into the analysis is the magnitude of national expenditures in South Dakota. South Dakota's total personal income usually runs annually slightly over $3 billion. In fiscal 1972, Federal outlays in South Dakota totalled $854,722,035. Department of Agriculture assistance, $246,496,828, headed the list. By 1975, the total amount had increased to $984,837,000, but by that year, HEW was in the lead accounting for

$354,949,000, compared to the previous $241,273,000. The 1975 totals represented almost $1,500 for every person in the State—about 15 percent higher than in 1972.

What observations can be made from these data *re* revenue sharing as a fiscal resource?

First: Obviously, revenue sharing provides new elbow room for local financing. It can be argued that the greater the available resources and the larger the jurisdiction, the wider the range of budgetary choices. This has opened up new options for hard pressed municipal governments.

Second: Compared with other Federal outlays, general revenue sharing is of minor consequence and other grant programs are continuing to receive major consideration.

Third: A major problem with revenue sharing as a rural government financial resource is its volatility. The use of a single per capita income year produces wide fluctuations. Unlike national per capita income, which over the past 5 years has regularly increased from $200 to $500 per year, South Dakota's income has gone up over $1,100 in 1973, only to drop in 1974.

Fourth: The formula, with its disregard of utility and enterprise earnings, and volunteer activity, results in great inequities on the municipal level; and its reliance on county income per capita data for townships results in distribution without due regard for need.

Fifth: On the local level, revenue sharing seems not to have produced major changes in fiscal systems, and for the most part, seems at best, "more of the same" with a perpetuation of previous inadequacies in governmental structure and organization.

NONFISCAL ASPECTS

While we are concerned here, I assume, primarily with fiscal implications, the impact of revenue sharing on non-fiscal aspects deserves attention. We should expect our local governments to be highly responsible to the wishes and needs of the people. We should also expect them to exhibit competence in formulating public policy and in executing decisions which have been made. This demands a degree of professionalization.

As now organized, most rural governments, at least in South Dakota, are not responsive to needs and are administered by personnel lacking in professional training. The needs are great. According to the NEA's *Rankings of the States, 1976*, South Dakota had fewer physicians per 100,000 resident population than any other State; next to North Dakota, South Dakota spent the least for health and hospitals; South Dakota tied with Mississippi in having the lowest average salary for public school teachers; South Dakota had slightly over one-third of the population older than 25 with less than 1 year of high school education; and, in terms of economic development, South Dakota had the lowest per capita retail sales in the United States.

What has been the impact of revenue sharing on this situation? Have local governments reacted to new revenues by acquiring trained personnel and developing strategies to meet problems? Perhaps it is too soon to expect results. But the outlook does not seem favorable.

Long ago, Roscoe Martin in *Grass Roots* (1957) pointed out that local government is not that capable. More recently, then Governor

Carter, at a Princeton Conference, stated, "In some ways, in the past—and I hate to say this as Governor of a State—an enlightened President and his executive leaders have been closer to the people than have governors and mayors and county commissioners and even congressmen."

Revenue sharing, general revenue sharing or otherwise, unaccompanied by requirements for organizational or management improvements may only reinforce the existing outmoded structure. The principal function of the substate regional organizations, six in number in South Dakota, is writing grant proposals for status quo governments. The popularity of general revenue sharing lies in part to the absence of the grant proposal type requirements.

In my study of township governments, where road construction and maintenance is the predominate function, I asked township officials if they would expand expenditures for weed control and fire protection—almost the only two other functions authorized, to insure that at least 10 percent were devoted to these purposes avoiding the loss of general revenue funds under the proposed two-function requirement. Without exception, the answer was "yes." So township officials are also game players.

General revenue sharing might have been the catalyst for modernization. Perhaps the opportunity is only delayed. The report by the Comptroller General's Office, *Revenue Sharing. Its Use By and Impact on Local Governments* (April 25, 1974) provides in the examples cited, some basis for optimism (pp. 26–7), but time is needed for proper evaluation.

One comparatively recent development in the past decade provides at least an alternative worthy of exploration. If the present governmental structures—townships and small towns—are as unchangeable as the proverbial law of the Medes and the Persians—perhaps the substate regional governments should become operational by intergovernmental contract with revenue sharing inducement. Without increasing the power of such units *from above*, (*i.e.*, by state action), functions could be authorized *from below* by local agreement. There are signs of this being acceptable, and with financial inducement, it might be expanded rather rapidly.

At present, substate regional governments are suspect and probably are not that good. But they have the advantage of comprising larger areas and greater population, and due to their scale of operation and close relationship to grant programs, possess greater potential for employing professional expertise. My suggestion relative to a new look at priorities is that *who* receives new resources is as important a consideration in rural government as the amount and permissible uses.

SUMMARY

As a rural State, South Dakota is proportionately more dependent on Federal largess than more populated States. While general revenue sharing has added to financial resources in a significant way, allocations operate unevenly in meeting needs. This is accounted for, among other factors, by the wide fluctuations in per capita income and the inequities of the formula in failing to consider non-tax income.

Non-fiscal resources are as important as fiscal resources in the improvement of local government services. Revenue sharing has not promoted governmental modernization but has had the effect of strengthening the status quo. Special attention ought to be given to the status of substate regional governments. Funding of joint local government ventures with substate regions serving as brokers or administrators should be encouraged, but only if the organization of the substate regions is itself improved and made more responsible and responsive than it now appears to be.

One of the major problems confronting rural areas as populations decline, will be the defensive attitude relative to rural government. Innovative ideas and discrete incentives to change will help.

APPENDIX A

GENERAL REVENUE SHARING: SOUTH DAKOTA COUNTY GOVERNMENTS

County	Population	Tax collected	Total 1972 expenditures	Revenue sharing 1972	Per capita tax	Per capita expenditures	Per capita revenue sharing	Revenue sharing as percent of tax
Aurora	4,183	388,412	433,160	116,772	92.85	103.55	27.92	30.1
Beadle	20,877	798,952	1,146,079	192,002	38.27	54.90	9.20	24.0
Bennett	3,088	277,764	366,485	65,116	89.95	118.68	21.09	23.4
Bon Homme	8,577	441,883	702,424	211,012	51.52	81.90	24.61	47.8
Brookings	22,158	810,888	972,248	235,164	36.59	43.88	10.62	29.0
Brown	36,920	1,453,247	2,362,616	360,570	39.63	63.99	9.77	24.6
Brule	5,870	416,905	452,682	132,890	71.02	75.83	22.64	31.9
Buffalo	1,739	115,677	177,053	23,349	66.52	101.81	13.43	20.2
Butte	7,825	358,538	580,678	115,743	45.82	74.21	14.79	32.2
Campbell	2,866	356,862	502,743	62,119	124.51	175.41	21.67	17.4
Charles Mix	9,994	619,053	804,258	207,818	61.94	80.47	20.79	33.5
Clark	5,515	392,534	570,402	126,922	71.17	103.43	23.03	32.3
Clay	12,923	505,807	611,929	143,501	39.11	47.35	11.10	28.4
Codington	19,140	595,246	745,423	191,821	31.15	38.95	10.02	32.2
Corson	4,934	305,491	443,620	96,584	61.17	88.83	19.34	31.6
Custer	4,598	256,752	690,616	60,799	54.65	147.00	12.94	23.7
Davison	17,319	479,521	864,774	184,146	27.69	49.93	10.63	38.4
Day	8,713	679,320	1,608,787	209,203	77.97	184.64	24.01	30.8
Deuel	5,686	360,392	682,223	96,673	63.38	119.98	17.00	26.8
Dewey	6,170	143,543	366,891	54,271	27.76	59.36	10.50	37.8
Douglas	4,569	347,998	617,233	115,663	75.15	135.10	25.31	33.2
Edmunds	5,548	377,989	471,887	114,494	68.13	85.05	20.64	30.3
Fall River	7,505	384,721	640,329	86,261	51.26	85.32	11.49	22.4
Faulk	3,893	381,000	764,504	103,354	97.87	196.38	26.55	27.1
Grant	9,005	519,027	798,751	181,465	57.64	88.70	20.15	35.0
Gregory	6,710	495,523	532,109	165,648	73.85	79.30	24.69	33.4
Haakon	2,802	233,890	275,052	83,395	83.47	98.16	29.76	35.7
Hamlin	5,172	405,449	539,809	145,153	78.59	104.37	28.07	35.7
Hand	5,883	529,581	956,313	124,296	90.02	162.55	21.13	23.5
Hanson	3,781	304,623	256,238	86,902	80.57	67.76	22.98	28.5
Harding	1,855	288,799	398,991	59,580	155.69	215.09	32.12	20.6
Hughes	11,632	544,626	779,680	113,560	46.82	67.03	9.76	20.9
Hutchinson	10,379	646,316	737,338	243,333	62.27	71.04	23.44	37.6
Hyde	2,515	274,674	338,168	65,107	109.21	134.46	25.89	25.3
Jackson	1,531	100,176	139,063	30,881	65.43	90.83	20.17	30.8
Jerauld	3,310	325,285	375,496	91,014	98.27	113.44	27.50	28.0
Jones	1,882	236,056	282,929	54,945	125.43	150.33	29.20	23.3
Kingsbury	7,657	572,436	650,364	183,311	74.76	84.94	23.94	32.0
Lake	11,456	670,268	672,590	263,046	58.51	58.71	22.96	39.2
Lawrence	17,453	596,231	1,034,669	152,355	34.16	59.28	8.73	25.6
Lincoln	11,761	610,788	794,209	188,347	51.93	67.53	16.01	30.8
Lyman	4,060	213,429	351,999	85,956	52.57	86.70	21.17	40.3
McCook	7,246	554,499	618,828	167,661	76.52	85.40	23.14	30.2
McPherson	5,022	464,262	748,610	132,880	92.45	143.07	26.46	28.6
Marshall	5,965	347,777	1,116,046	145,028	58.30	187.10	24.31	41.7
Meade	16,618	459,553	1,143,204	170,372	27.65	68.79	10.25	37.1
Mellette	2,420	182,097	346,559	44,632	75.25	143.21	18.44	24.5
Miner	4,454	347,366	366,016	106,880	77.99	82.18	24.00	30.8
Minnehaha	95,209	1,590,110	3,420,128	458,183	16.70	35.92	4.81	28.9
Moody	7,622	491,430	458,851	182,013	64.47	60.20	23.88	37.0
Pennington	59,349	1,891,153	3,396,158	421,923	31.86	57.22	7.11	22.3
Perkins	4,769	467,815	630,990	123,558	98.09	132.31	25.91	26.4
Potter	4,449	393,778	480,302	110,314	88.51	107.96	24.80	28.0
Roberts	11,678	732,704	965,742	259,992	62.74	82.70	22.26	35.9
Sanborn	3,697	299,049	381,584	97,276	80.89	103.21	26.31	32.5
Shannon [1]	8,198	----------	111,222	----------	11.68	13.57	----------	----------
Spink	10,595	735,278	1,006,247	230,162	69.40	94.97	21.72	31.3
Stanley	2,457	221,484	297,505	54,087	90.15	121.08	2.01	24.4
Sully	2,362	311,299	415,955	74,574	131.79	176.10	31.57	24.0

See footnotes at end of table.

APPENDIX A—Continued

GENERAL REVENUE SHARING: SOUTH DAKOTA COUNTY GOVERNMENTS—Continued

County	Population	Tax collected	Total 1972 expenditures	Revenue sharing 1972	Per capita tax	Per capita expenditures	Per capita revenue sharing	Revenue sharing as percent of tax
Todd [1]	6,606	116,447	170,773	....	17.63	25.85	....	....
Tripp	8,171	552,569	924,441	132,888	67.63	113.14	16.26	24.0
Turner	9,872	465,851	653,342	184,898	47.19	66.18	18.73	39.7
Union	9,643	551,391	867,286	146,805	57.20	89.94	15.22	26.6
Walworth	7,842	[illegible]28,805	647,511	157,953	41.93	82.57	20.14	48.0
Washabaugh [1]	1,389	....	104,222	....	53.65	75.03	....	....
Yankton	19,039	[illegible],025	994,152	182,958	28.89	52.22	9.61	33.3
Ziebach	2,221	[illegible],272	238,413	29,217	59.10	107.34	13.15	22.3
Total	665,50[illegible]	31,182,957	47,937,021	9,265,273	46.86	72.03	13.92	29.7

[1] Unorganized.

APPENDIX B

GENERAL REVENUE SHARING: SOUTH DAKOTA MUNICIPAL GOVERNMENTS

City	Population	Revenue sharing	Per capita 1972	Per capita 1976
Aberdeen	26,476	378,554	14.3	19.2
Brookings [1] [2]	13,717	75,342	5.4	8.2
Canton	2,665	17,199	6.4	9.9
Chamberlain	2,626	38,912	14.8	15.0
Hot Springs [1]	4,434	20,760	4.6	9.0
Huron	14,299	178,381	12.4	16.1
Lead	5,420	67,513	12.4	15.1
Madison [2]	6,315	73,233	11.6	19.4
Milbank	3,727	[illegible]5,164	14.8	12.5
Mitchell	13,425	192,383	14.3	11.0
Mobridge	4,545	54,420	11.9	10.7
Pierre [1] [2]	9,699	70,566	7.2	5.3
Rapid City	43,836	507,624	11.8	16.7
Redfield	2,943	54,610	18.5	14.4
Sioux Falls [2]	72,488	1,015,710	14.0	16.2
Spearfish	4,661	46,630	10.0	11.5
Sturgis [1]	4,536	47,616	10.5	13.3
Vermillion [1] [2]	9,128	41,741	4.6	5.5
Watertown [2]	13,388	161,176	12.0	13.2
Winner [2]	3,789	17,742	4.6	4.2
Yankton	9,279	116,747	12.5	12.8

[1] City owns and operates a liquor store.

[2] City owns and operates an electric plant; Sioux Falls has both municipal and privately owned operations.

APPENDIX C

CLAY COUNTY (SOUTH DAKOTA) TOWNSHIP REVENUE SHARING DATA

Jurisdiction	1970 population	1969 PC income	1971 Tax effort	1971 transfer	1972 1st allocation	1973 population	1972 PC income	1975 tax effort	1975 transfer	1976 7th allocation
State	679,000	2,387	[1] 291.7	....	3,982,701	683,000	2,949	[1] 353.9	....	3,325,000
Clay County	12,923	2,382	575,180	57,914	71,798	13,063	2,911	584,811	63,612	53,711
Vermillion	9,128	2,369	171,027	50,124	21,912	9,322	2,882	281,970	164,536	26,041
Wakonda	290	2,382	14,894	2,630	1,827	282	2,987	15,700	3,949	1,350
Townships:										
Bethel	258	2,382	10,000	5,500	1,248	251	2,987	10,4[illegible]	0	961
Fairview	397	2,382	3,842	4,319	953	388	2,987	10,[illegible]	2,285	950
Garfield	332	2,382	12,385	0	1,546	320	2,987	9,561	0	878
Glenwood	250	2,382	9,523	2,500	1,189	243	2,987	12,308	0	1,130
Meckling	389	2,382	12,390	1,617	1,549	377	2,987	11,318	1,918	1,039
Norway	214	2,382	5,000	1,960	624	206	2,987	5,224	0	480
Pleasant Valley	255	2,382	6,373	3,114	796	248	2,987	9,587	0	881
Prairie Center	232	2,382	4,100	500	557	226	2,987	10,471	0	962
Riverside	227	2,382	9,660	0	1,206	221	2,987	6,421	0	590
Spirit Mound	261	2,382	8,799	36	1,098	254	2,987	9,533	0	876
Star	273	2,382	7,274	1,775	906	265	2,987	9,991	0	917
Vermillion	203	2,382	5,409	1,320	675	196	2,987	3,620	0	413
Total	3,291	....	94,755	22,641	12,347	3,195	....	108,836	4,204	10,077

[1] Millions of dollars.

GENERAL REVENUE SHARING AND THE NONMETROPOLITAN SMALL COMMUNITY

[By Clara Penniman*]

Congressional renewal of the State and Local Assistance Act in 1976 may have established general revenue sharing as an "irreversible" national policy and added its annual outlay as still another of the many items comprising 75–80 percent of the national budget that the Office of Management and Budget designates as "uncontrollable." Congress is unlikely to return to exclusive reliance on categorical, project, or even block grants, for assistance to State and local governments. The critics, whatever the merits of their views, have been defeated by the intergovernmental lobby.[1]

70 Years of Tax Sharing in Wisconsin

Although national revenue sharing is only 5 years old, several States have had more than 50 years of experience. Wisconsin was one of the earliest States to institute tax sharing: first with utility taxes (1901), next with corporate and individual income taxes (1911), and then with general sales tax (1962).[2] No restrictions were attached to local spending of shared taxes, and the only auditing of expenditures by the State was through its general program of municipal auditing to assure usual fiscal controls.

A few findings stand out from Wisconsin's long tax sharing experience:

(1) The Wisconsin legislature in adopting State utility taxes and then in adopting corporate and personal income taxes also adopted tax sharing formulas that emphasized tax origin which in practice exaggerated the "have" and "have not" characteristics of individual local government recipients.

(2) There is no evidence that the framers of the shared tax formulas anticipated the rich tax dividends for a small minority of Wisconsin communities. Initially, the shared taxes were viewed largely as replacements for no-longer-available local taxes. *But once established, the formulas seemed cast in iron.* Only after 60 years did the legislators reduce the sharing advantage of the wealthier communities and take some account of need and tax effort.

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[1] For a perceptive early criticism of Federal revenue sharing by a long-time scholar in the State and local government field, see William Anderson, "Myths of Tax Sharing," *Public Administration Review*, Vol. XXVIII, No. 1 (Jan./Feb., 1968) pp. 10-14. During the 1976 debates, Senator William Proxmire of Wisconsin, Chairman of the Joint Economic Committee, made an unsuccessful fight against renewal of general revenue sharing. Although editorials in the leading State newspapers, as well as in many smaller papers, criticized Proxmire and praised his Wisconsin colleague, Senator Gaylord Nelson for his support, the State's voters reelected Proxmire in November by better than a 73% margin. It is doubtful that his revenue sharing opposition entered into the calculations of most voters.

[2] Massachusetts and New York are two other States with long experience in sharing taxes with their local governments.

page 102 blank.

(3) No tax that the State has once shared with its local governments has ceased to be shared. Or, to put it more accurately, wherever there have been changes, such as the use of a shared tax pot of more than one tax, the total remained at least as high as before.

(4) Tax sharing in Wisconsin postponed or avoided State assumption of local functions. Wisconsin to this day remains high among the States in the proportion of State-local expenditures that are spent by its counties and municipalities. The State today turns over about 75 percent of its general revenues to local governments in State aids or shared taxes. Unlike the sequence of the national government, Wisconsin had its shared tax system well in place before State grants-in-aid became significant.

(5) Since Wisconsin was directly sharing taxes (with different formulas for each type of tax), there was no guarantee of the amounts of moneys to be shared. Each government's return depended on the State's receipts each year. Local governments shared enthusiastically in the growth of the State's economy but grumblingly suffered in economic downswings. Only to the extent later State grant formulas recognized need, did municipalities have some cushion against the dips of the economy that adversely affected state tax receipts.[3] Recent formula changes provide more local security in shared taxes.

GENERAL REVENUE SHARING AND WISCONSIN TAX SHARING

In contrast to the Wisconsin tax sharing, the National State and Local Assistance Act, originally and as extended, appropriates a specified amount of funds each year. The general revenue sharing formulas with this established base will neither grow nor decline with the economy and will produce only mild differences from year to year for any of the recipient governmental units.

Again in contrast to Wisconsin's tax sharing, the general revenue sharing provisions include some restrictions as to local government use, but in practice these have proved to be frail indeed. Whether the more encompassing civil rights amendments in 1976 will prove enforceable remains to be seen.[4]

On two issues, it is likely that the national experience will follow Wisconsin's. Once established, revenue sharing continues and the initial formulas have great longevity. Renewal of general revenue sharing in 1976 practically guarantees its long run perpetuation. State and municipal governments will now build these funds firmly into their base budgets. The earlier skepticism that Congress might drop the program is likely to fade. Combined with the increased probability of general revenue sharing continuing is the equal probability of little, if any, change in the distribution formulas. Despite criticisms, Congress and the President showed no disposition to attempt statutory formula modification in 1976, and the intergovernmental lobby pushed for no changes in 1976.

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[3] Considering the major shared taxes were the corporate income and the progressive personal income tax (until 1962 when Wisconsin first adopted a sales tax), local governments experienced significant changes in the productivity of State shared taxes from the early part of the century.

[4] It is true under the 1972 Act that Chicago and a few other governments had GRS funds held up temporarily on the charge that the city was violating the nondiscrimination requirements in some instances but after a short time moneys were again released. Whether the new and broader requirement for State and local conformity to national civil rights standards will have an effect, it is too early to know. This writer is doubtful that withholding of funds under general revenue sharing will prove more politically feasible than it has over the 60 years and more of Federal grants.

WISCONSIN EXPERIENCE IN THE 1970'S IN NONMETROPOLITAN COUNTIES

But what can we say as to the effect of general revenue sharing on tax levels, tax types, levels of expenditures, functional decentralization, quality of government, and on governmental structure? At least a dozen substantial studies, outside of governmental evaluations, have attempted to provide some answers. Yet Allen Manvel's statement in 1975 remains essentially true: "It will be a long time before data needed for sophisticated efforts to measure the program's impact can be applied. . ."[5] If one attempts now to push findings to nonmetropolitan counties and their communities, we are further limited. This author suggests possible answers to only five questions and those largely in the context of Wisconsin's nonmetropolitan counties and their political subdivisions. What has happened to property tax rates since the beginning of general revenue sharing? Has borrowing increased, decreased, or stayed constant? What has happened to expenditures? Is there any evidence of a likely impact of general revenue sharing on rural governmental structure? What might one forecast for program decentralization, stressed by many of the supporters of general revenue sharing on both the political right and left? As the phrasing of the questions suggests, we have more precise data to bear on the first three questions than on the last two.

Property Taxes

Supporters of general revenue sharing have repeatedly pointed to the desirability of substituting funds largely raised by the Federal progressive income tax for the less progressive property taxes.[6] Has this happened? Or rather, since our data will not allow any such simple conclusion, have property taxes gone down in Wisconsin nonmetropolitan municipalities since general revenue sharing funds have become available? What evidence can we gather and what interpretations can we reasonably make of these data?

Tables one, two, and three present the total full value assessments of all taxed property in the municipalities of the State, of its metropolitan counties, and of its nonmetropolitan counties, together with the total taxes collected, and the effective rates of taxation for each year from 1970 through 1976.[7] Although initial payments under national general revenue sharing were made in December, 1972, most Wisconsin municipal budgets and property tax collections were

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[5] Allen Manvel, "The Fiscal Impact of Revenue Sharing" *Annals of the American Academy of Political and Social Science*, Vol. 419, May, 1975, pp. 36-49.

[6] Critics of the property tax would argue that the property tax is not only less progressive but may be the most regressive and possibly undesirable tax levied by State and local governments. This judgment is disputed by Henry Aaron of the Brookings Institution (see his book, *Who Pays the Property Tax?*, Washington, D.C.: Brookings, 1975).

A number of other economists today also find the general property tax as progressive as a low rate income tax and more progressive than a general sales tax. This revised judgment does not yet seem to have affected the politics of the States in the 1970s nor the recommendations of the Advisory Commission for Intergovernmental Relations. (See ACIR, *Improving Urban America: A Challenge to Federalism*, 1976, p. 3 as an example.)

[7] The Wisconsin property assessment equalization effort is recognized in the State and nationally as an unusually successfully one. It was initiated in the early part of the century to produce assessments for railroads and utility property in the State and to apply thereto the average full value tax rate in the State. The methodology and its practice have survived court tests and the State-local grant-in-aid formulas and other State-local fiscal legislation. The author believes the integrity of the State's statistics, therefore, is quite adequate for the present analytical purposes.

TABLE 1.—PROPERTY TAXES IN WISCONSIN TOWNS IN THE 1970'S [1]

	I—All Wisconsin towns			II—Towns in metropolitan counties			III—Towns in nonmetropolitan counties		
	Full value property	Total property taxes	Average full value rate	Full value property	Total property taxes	Average full value rate	Full value property	Total property taxes	Average full value rate
Year:									
1970	$8, 972, 241, 410	$246, 363, 257	$0. 02745	$2, 534, 852, 150	$81, 779, 232	$0. 03226	$6, 437, 389, 260	$164, 584, 025	$0. 02557
1971	10, 337, 058, 800	278, 400, 007	. 02693	3, 116, 645, 500	93, 717, 760	. 03007	7, 220, 413, 300	184, 682, 247	. 02558
1972	11, 532, 485, 900	316, 710, 519	. 02746	3, 978, 361, 200	107, 619, 084	. 02705	7, 554, 124, 700	209, 091, 430	. 02768
1973	13, 141, 898, 200	324, 853, 343	. 02471	3, 828, 971, 800	105, 232, 101	. 02748	9, 312, 926, 400	219, 621, 242	. 02358
1974	15, 319, 309, 500	327, 916, 527	. 02140	8, 522, 467, 200	186, 181, 510	. 02185	6, 796, 842, 300	141, 735, 017	. 02085
1975	18, 203, 092, 691	378, 372, 715	. 02078	6, 000, 265, 392	128, 094, 381	. 02135	12, 202, 827, 299	250, 278, 334	. 02000
1976	20, 580, 113, 373	418, 064, 448	. 02031	6, 787, 752, 218	141, 676, 738	. 02087	13, 792, 361, 155	276, 387, 710	. 02004

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[1] The U.S. Bureau of the Census designates subdivisions in States where the terms town or township is used as "townships," but Wisconsin designates the political subdivision for the survey township "town" in accord with New England and New York practice. These governmental units have general municipal powers under the State constitution though they are not incorporated as would be a village or city and lose territory or even disappear (as in Milwaukee County) with village and city incorporations and annexations. Although Wisconsin towns exercise police welfare, sanitation, and other general powers, the main functions of towns in the rural areas of the State are to build and maintain roads and collect school, county, and State (minor) property taxes along with town taxes. The data shown above for all Wisconsin towns (I) were taken from annual State bulletins entitled "Town, Village and City Taxes," published each fall by the Wisconsin Department of Revenue, Division of State and Local Finance, Bureau of Local Fiscal Information. The data are shown above for the year collected. Technically the taxes were levied in the preceding year. The data for columns under "Towns in Metropolitan Counties" (II) were assembled by the author from the detail of the State reports for 12 of the SMSA counties in the State: Brown, Dane, Kenosha, La Crosse, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Washington, Waukesha, and Winnebago. Census also includes Douglas (for the Duluth-Superior area) and St. Croix (for the twin cities of Minneapolis-St. Paul), but despite the SMSA definitions, these Wisconsin counties are essentially rural. The data under nonmetropolitan counties are simply the result of subtracting columns under II from columns under I.

TABLE 2.—PROPERTY TAXES IN WISCONSIN VILLAGES IN THE 1970's

	I—All Wisconsin villages			II—Villages in metropolitan counties			III—Villages in nonmetropolitan counties		
	Full value property	Total property taxes	Average full value rate	Full value property	Total property taxes	Average full value rate	Full value property	Total property taxes	Average full value rate
Year:									
1970	$3, 237, 130, 250	$104, 199, 962	$0. 03218	$2, 128, 069, 850	$69, 508, 384	$0. 03266	$1, 109, 061, 400	$34, 691, 578	$0. 03128
1971	3, 555, 062, 900	116, 805, 855	. 03285	2, 339, 906, 000	79, 278, 379	. 03388	1, 215, 156, 900	37, 527, 476	. 03088
1972	3, 833, 132, 600	129, 804, 400	. 03386	2, 985, 059, 800	102, 200, 836	. 034237	848, 072, 800	27, 603, 570	. 03254
1973	4, 223, 121, 000	134, 269, 666	. 03179	2, 760, 574, 500	92, 514, 083	. 03351	1, 462, 546, 500	41, 755, 583	. 02854
1974	4, 658, 489, 300	132, 032, 159	. 02834	3, 037, 423, 400	92, 440, 693	. 03043	1, 621, 065, 900	39, 591, 466	. 02442
1975	5, 218, 518, 610	145, 250, 434	. 02783	3, 460, 786, 200	108, 245, 248	. 03127	1, 757, 732, 410	37, 005, 186	. 02105
1976	6, 092, 969, 780	164, 219, 717	. 02695	3, 665, 387, 105	115, 233, 674	. 03143	2, 427, 582, 675	48, 986, 043	. 02017

Source: See Table 1.

TABLE 3.—PROPERTY TAXES IN WISCONSIN CITIES IN THE 1970'S

	I—All Wisconsin cities			II—Cities in metropolitan counties			III—Cities in nonmetropolitan counties		
	Full value property	Total property taxes	Average full value rate	Full value property	Total property taxes	Average full value rate	Full value property	Total property taxes	Average full value rate
Year:									
1970	$19, 223, 671, 900	$704, 999, 791	$0. 03667	$14, 329, 545, 544	$538, 338, 110	$0. 03757	$4, 984, 126, 356	$166, 661, 681	$0. 03344
1971	20, 898, 377, 600	783, 769, 337	. 03750	15, 578, 313, 930	598, 618, 799	. 03842	5, 320, 063, 670	185, 150, 528	. 03480
1972	21, 897, 036, 400	854, 528, 495	. 03902	16, 183, 393, 300	653, 475, 975	. 04036	5, 713, 643, 100	201, 052, 520	. 03518
1973	23, 468, 231, 100	867, 568, 020	. 03696	17, 270, 013, 700	666, 511, 374	. 03859	6, 198, 217, 400	201, 046, 646	. 03243
1974	[illegible], 535, 196, 300	863, 836, 781	. 03382	18, 829, 372, 600	664, 918, 008	. 03531	6, 705, 823, 700	198, 918, 773	. 02966
1975	28, 101, 372, 229	938, 667, 146	. 03340	21, 125, 957, 041	724, 647, 270	. 03430	6, 975, 415, 188	214, 019, 876	. 03068
1976	31, 876, 806, 935	1, 018, 979, 106	. 03196	23, 393, 176, 549	775, 405, 373	. 03315	8, 483, 630, 390	243, 573, 733	. 02870

Source: See table 1.

already established for 1973.[8] Effects of the new moneys then would more likely show up in the succeeding years.

As is common in observing results of social actions, not everything except Federal revenue sharing remained constant from 1972 onward. There would have been a few annexations by cities and villages that would have reduced town areas. Much more importantly, the Wisconsin legislature significantly revised the State's tax sharing formulas and some of its grant formulas, plus accepting the governor's recommendation to allocate all of the State's share of general revenue sharing funds in grants to the school districts. State shared taxes, without the State's portion of Federal revenue sharing funds, rose in the 1973–75 biennium about $275 million—almost as much as Wisconsin's State and local portion of general revenue sharing funds for the 2 years. At least a proportionate increase flowed to local governments from the State in fiscal 1976.

What happened to local property taxes in Wisconsin municipalities in the 1970s then reflects both additional Federal and State funding as well as local decisions for governmental buildings or to enrich present programs, or develop new programs, or merely to maintain programs in the face of continuing inflation. Examination of the tables suggests a few conclusions. The full value of taxable property in the State has continued to rise each year. Property values rise with new construction, increased demand for properties, and inflation. (The bulk of the property assessed would be land and buildings. Personal property plays a minor role.) Nonmetropolitan county town properties (largely farms in metropolitan counties) grew in full value assessments from $6.4 billion in 1970 to $13.8 billion in 1976, or 116 percent; village properties grew in value from $1.1 billion to $2.4 billion, or 118 percent; and city property values grew from $5 billion to $8.5 billion, or 70 percent. Town property tax rates in the State which had grown in '71 and '72 (as well as in the immediately preceding years) declined from 1973 through 1976. Village rates showed a similar pattern. Although city rates were less in 1973, '74, '75, and '76 than in 1972, 1975 rates were slightly above 1974.[9]

Annexations and incorporations in metropolitan counties make comparisons over the years for property values and tax levies questionable. Tax rates still have meaning, however, and here there were also rate reductions in the aggregate—either, after 1972 or, in the case of towns, after 1970 or 1971. Metropolitan county towns show rate reductions of 35 percent from the 1970 peak to 1976; nonmetropolitan county towns show rate reductions of 28 percent from the 1972 peak to 1976. Tax rates in metropolitan county villages were almost 9 percent lower in 1976 than at their peak in 1972, but nonmetropolitan county villages show a dramatic aggregate drop of 38 percent between 1972 and 1976. Metropolitan city rates and nonmetropolitan county city rates dropped by similar percentages: 18 percent and 18.5 percent. Although these figures suggest that rural county towns and villages profited most from Federal general revenue sharing (and revisions in State shared taxes and aids), this may be too simple a conclusion. Metropolitan and nonmetropolitan county towns had almost identical average full value tax rates in 1976: \$.02087 and \$.02004. Metropolitan villages and cities dropped from peak mill rates somewhat higher than nonmetropolitan villages and cities—\$.03423 and \$.04036 to \$.03254 and \$.03518—and ended higher in 1976—\$.03143 and \$.03315 to \$.02017 and \$.02870. These statistics suggest that nonmetropolitan villages in Wisconsin have gained more from Federal general revenue sharing and the State's shared tax and aid changes than metropolitan communities.

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[8] Wisconsin city and village budget years are the calendar year. Town budget years usually run from April through March. Necessary property taxes, whether established by a spring or fall budget, are collected the following year. Thus town property tax levies, and in most instances city and village, were established in 1972 without taking any account of general revenue sharing moneys distributed in December 1972 or during calendar 1973. Town, villages, and cities also collect county taxes and these also would have been calculated too early to be much affected by these first revenue sharing payments.

[9] All of the above analyses are only for nonmetropolitan county towns, villages, and cities.

Municipal Debts and Borrowing

As tax rates moved slightly downward, what was happening to municipal borrowing? State reports on borrowing are not as readily useful as are property tax analyses and are 2 years behind. Overall in the State, however, indebtedness for cities, villages, and towns has declined. In fact, overall indebtedness of counties, municipalities, and school districts in 1974—(\$1.6 billion)—was somewhat below the 1970 figure of \$1.8 billion. The State's municipalities show more reduction in debt than its counties or school districts. If the nonmetropolitan municipalities were broken out, these would no doubt show similar or greater debt reductions than for both metropolitan and nonmetropolitan municipalities as above. But going back to the statewide figures, the indebtedness per \$1,000 of equalized valuation has, (with the increased valuation of property) dropped more dramatically than the dollar overall reduction—from \$45.15 per \$1,000 of equalized valuation in 1970 to \$34.35 per \$1,000 of equalized valuation in 1974.[10] We can, therefore, assert that the downward trends in tax rates shown above were achieved without increasing indebtedness, at least through 1974, and in all probability through 1976.

Expenditures

Despite the downward trend in property tax rates and debt and despite general revenue sharing and the almost equal increase in State shared taxes and aids, property tax collections grew in rural towns, villages, and cities from 1970 through 1976 from \$164.6 million to \$276.4 million (67.9 percent), \$34.7 million to \$49 million (41 percent), and \$166.7 million to \$343.6 million (106 percent), respectively. Only the fact that property values grew faster produced a net decrease in rates. Increases in school expenditures (largely State-ordered programs plus salary increases) accounted for almost all of town and village property tax growth and much of the city property tax growth. Increased attention to pollution control, employee salary demands, together with increases in the cities' shares of county welfare and road expenditures, may explain a substantial part of the remainder of the higher city property taxes.

The continued upward trend of expenditures from property taxes should prompt caution in scholarly generalizations on the contributions of general revenue sharing. Any rural community faced with radical changes such as discovery of minerals, mining development, and rapid population in-migration will have few immediate resources to meet education, housing, and other needs. General revenue sharing could assist only minimally in such a crisis.

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[10] Figures taken from Wisconsin Department of Revenue, Bulletin No. 52, dated July, 1976, *Indebtedness 1974, Long-Term Indebtedness of Wisconsin* Political Subdivision, 1974, Schedules 1 and 2, page 2. Indebtedness figures are reported by counties, towns, villages, cities, school districts, and vocational, technical and adult education districts whereas property tax levies and rates include county and all school taxes in the town, village, and city figures since these municipalities are the local tax collectors.

CONCLUSIONS

This brief study focusing on Wisconsin nonmetropolitan counties and their municipalities should also give a sense of the impact of general revenue sharing on nonmetropolitan counties and municipalities throughout the nation.

After the Bureau of the Census releases State and local government data from its 1977 governmental data collection, the following hypotheses can be more thoroughly tested:

(1) The generally lower per capita income in more rural counties, together with high tax effort, brings them higher per capita allotments under the general revenue sharing formula than in metropolitan counties. This finding in Wisconsin has already been duplicated in Pennsylvania, Washington, and elsewhere.

(2) Nevertheless, the general revenue sharing funds frequently are not large enough to have achieved anything dramatic—perhaps earlier work in a road here or there, earlier purchase of a fire truck, a piece of road equipment, or the substitution of general revenue sharing moneys for local moneys in one or another on-going program. Expenditures so far do not suggest the probability of major new program decentralization nor even a sufficient easing of demands on property taxes to permit leeway for crises. Local governmental officials in seeking general revenue sharing most often emphasized the tax crisis facing them.

(3) The slowing of growth or actual reduction in local property tax rates in Wisconsin could not have been achieved with general revenue sharing alone. Rather, the combination of general revenue sharing, increased State aids and shared taxes, plus inflation of property values (inflation of course also raised governmental costs), brought lower rates with reduction in debt.

(4) Little or no evidence exists in Wisconsin, or elsewhere, of governmental consolidations, reorganizations, or improvement in governmental effectiveness as a result of general revenue sharing. The more than 60 years of tax sharing in Wisconsin produced a few separate incorporations to take advantage of the formulas in terms of very local conditions.

To make general revenue sharing (or State tax sharing) effective in achieving local governmental reorganization and consolidation would require formulas that represented political agreement as to local governmental structure. *If this political agreement existed, the States could legislate the structure, and both general revenue sharing and State tax sharing formulas would simply recognize the new order.* The absence of political agreement prevents both the changed structure and the "rational" formulas.

Legislating for the nation on general revenue sharing formulas is more difficult than in the individual State. (The American States have distributed powers to local governments in a variety of patterns.) Complaints of irrational reinforcing of governmental fragmentation by present formulas (or probably by most of other possible formulas) inevitably have some justification. But again the complainants, or their predecessors, had not succeeded in convincing State legislators or constitutional conventions (in Illinois or Michigan, for example) of the desirability of change.

Unless general revenue sharing is to grow substantially, including replacing some present Federal grants and/or substituting for new Federal grants in education and other programs, it is difficult to see that general revenue sharing will have a major impact. Local budgets will incorporate these moneys sufficiently, however, to make either elimination or change in formula of general revenue sharing politically improbable. Reform and restructuring of local government will require more direct action. Greater local innovation and program control and development may then follow.

A PROPOSED THREE-FACTOR FORMULA FOR STATE AID TO MUNICIPALITIES IN NEW MEXICO

[By Gerald J. Boyle*]

In concluding "A Pure Theory of Local Expenditures," C. M. Tiebout states,

> If consumer voters are fully mobile, the appropriate local governments, whose revenue expenditure patterns are set, are adopted by the consumer-voters. While the solution may not be perfect because of institutional rigidities, this does not invalidate its importance.[1]

It is at the local government level that individual preferences can be revealed and result in a bundle of public goods and services, more or less uniquely suited to those preferences. Such a solution can do nothing but enhance welfare, and every effort should be made to make available as many options as possible.

In order to maximize the possibilities of matching individual preferences and public goods and services, a full range of local governments must be available with respect to the mix of goods and services, location, size, etc. A major problem in a sparsely populated State, with relatively low per capita income, is to keep small communities economically viable. Not only does the option of a small city add to the welfare of those who prefer it, but viability at this level tends to lessen the growth and congestion of large cities.

In 1974, the State of New Mexico had 93 municipalities (excluding Albuquerque) distributed by size as follows:

Population size:	*Number of municipalities*
Under 1,000	44
1,000–10,000	36
Over 10,000	13
Total	93

A few of the smaller cities have vigorous tourist economies and are able to support an adequate level of public services. However, the large majority of small cities are poor and isolated and unable to support services at a satisfactory level. Given the economic status of most small cities, taxing authority[2] is of little use and the only solution for the continued existence of such cities is State financial assistance.

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[1] Charles M. Tiebout, "A Pure Theory of Local Expenditures," *Journal of Political Economy*, October, 1956.

[2] The State presently shares revenues of the gross receipts tax with cities, giving back one-fourth of the 4 percent collected. In addition, cities are now authorized to levy an additional — percent on gross receipts. However, it serves little purpose to give small cities additional tax authority because — percent of nothing is still nothing.

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New Mexico municipalities have received general purpose revenues from the State in the past few years. Most recently, for fiscal year 1976, municipalities received $7.2 million, based on the two factors of population and assessed valuation. The distribution formula used in fiscal year 1976 did not take account of the needs nor of the varying abilities of municipalities to finance their own activities. In fact, the $2.50 distributed per $1,000 of assessed valuation works in the opposite direction by providing relatively more to cities with high assessed valuation.[3]

During the past several years, legislative criticism of distribution has centered around three problem areas:

1. a standard for financial support,
2. recognition of the ability of local governments to support services from their own resources, and
3. measurement of need.

The proposed formula is designed to respond to these concerns of the legislature.

STANDARD OF SUPPORT

There is no well-defined standard of expenditures for municipalities. Even a comparison with other States is an almost impossible task. For instance, the U.S. Census of Governments does not collect data on individual cities under 10,000 population. The smallest population size group for which data are collected is under 2,500—this single category includes almost two-thirds of New Mexico's incorporated municipalities. However, even if such data were available, it would have very limited use in defining a standard for New Mexico cities. Not only is there a difference of geography and population mix with respect to cities in other States, there is also the differing division of responsibility between the State and its local governments. In New Mexico, for instance, the State collects about 75 percent of total taxes and local governments the remaining 25 percent—this relationship is just the opposite in a State like New Jersey.

Not only is there concern for a general standard of support, but in addition, concern was also expressed for some way to assure the exclusion of unnecessary, or frivolous type expenditures. To respond to this concern, the standard of support was restricted to the following basic services:

1. police protection,
2. fire protection,
3. streets and roads,
4. sanitation (excluding sewerage),
5. administration, and
6. general control.

The standard of support is limited to these services because they may be defined as essential general fund services. Since revenue sharing represents a distribution from the State in general to some city in particular, it would be difficult to justify financial support at a level that included expenditure for something such as a luxurious tennis complex. When revenues paid by the general taxpayer are distributed for the benefit of particular localities, some strings should be attached—otherwise, there is expenditure without representation.

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[3] Under-assessment also rewards cities doing the poorest job of assessing. See the "Sources of Data" section.

Next the cities were broken down into population size classes of under 1,000; 1,000 to 10,000; and over 10,000 (excluding Albuquerque). This was necessary because per capita spending is, to some extent, a function of size. Finally, per capita expenditures for basic services were arrayed for each population class and the 90th percentile was selected as an acceptable standard of support for New Mexico cities.

Population class	Per capita expenditure on basic services	
	90th percentile	Range
Under 1,000	$118.97	$5.60 to $287.18
1,000 to 10,000	105.42	$35.39 to $169.24
Over 10,000	112.36	$58.73 to $169.73

Therefore, the first factor (maximum per capita eligibility) in the proposed distribution formula is as follows:

City share equals City population times Basic services per capita expenditures at 90th percentile minus Basic service per capita expenditures for particular city.

When combined with the second factor (ability to pay), it is possible for a city to exceed the 90th percentile amount. To prevent this, the distribution is made so that the 90th percentile is the maximum amount possible.

ABILITY TO PAY

Cities differ in their abilities to support services due to levels of income and wealth. If the purpose of State revenue sharing is to support city services at some acceptable standard, then cities least able to support themselves should receive proportionately more than those with a better economic base. This is accomplished by weighting the maximum per capita eligibility by the relative position of each particular city with respect to per capita income and per capita gross receipts tax. Income is the best single measure of a city's economic base while gross receipts tax is the single most important revenue source.

The second factor (ability to pay) of the proposed distribution formula is as follows:

Maximum per capita eligibility times per capita income all cities over per capita income particular city plus per capita gross receipts tax all cities over per capita gross receipts tax particular city divided by 2.

Therefore, the per capita distribution for a particular city is weighted inversely with respect to its relative per capita and gross receipts tax revenues.

MEASURE OF NEED

There is no single standard of need that can be applied to a group of cities. Each city differs in its "needs," depending not only on the economic base but the composition of the residents as well. Citizens have no choice concerning the level of expenditures for the Federal government—there can be only one defense budget, for instance; we have a somewhat wider choice at the State level but in selecting a particular place to live the choice is widened to a great degree. In New Mexico, there are 93 incorporated municipalities as well as numerous other places in which to settle. At the local level, the choices are many and it would be unreasonable to expect the "needs" of one city to necessarily be the same as that of any other. For instance, the "needs" of a city made up primarily of retired citizens would differ greatly from that of a city similar in other respects but made up of young families with children. Therefore, in order to recognize the fact that each city is unique with respect to needs, the ratio of general fund balance to general fund expenditures is taken as a proxy to see whether or not a city is meeting its "needs." Using this ratio gets at the "needs" question through the back door. A high ratio of balance to fund tells nothing about the level of need, but does indicate that there are no *unmet* needs.

If the ratio of balance to fund is 10 percent or less, the city is spending all its revenues in order to meet the needs of its residents.[4] If the ratio is 50 percent or greater then the city has no unmet needs. For cities in between, the State distribution if scaled from 100 percent to zero as the ratio of balance to fund increases from 10 percent to 50 percent. In other words, a city with a ratio of 30 percent would receive only one-half its per capita distribution as determined by factors 1 and 2.

Therefore, the third factor (measure of need) of the proposed distribution formula is as follows:

Maximum per capita eligibility times Ability to pay factor times 1 minus General fund balance over General fund expenditures minus 0.1 times 2.5.

In summary, the three factor formula, when applied to New Mexico municipalities gives the following results:

Population class	Distribution		Number of cities qualifying
	Average per capita	Total	
Under 1,000	$18.70	$372,067	10
1,000 to 9,000	21.35	2,834,656	24
10,000 to 100,000	26.46	8,805,987	10
Total	24.75	12,012,710	44

The most surprising result is the large number of small municipalities receiving no distribution. Using the 90th percentile rule, one-tenth of the cities will receive no distribution. However, only 23 percent of cities under 1,000 population received any revenue at all due to high ratios of balance to fund. Two-thirds of the cities in the 1,000 to 10,000 class received funds, while 69 percent of cities over 10,000 received funds.

If such a formula were adopted, it would have some effect on the future financial policy of cities. The high ratios of general fund balance to general fund expenditures indicates a conservative financial policy. To the extent that a municipality is willing to trade its conservatism for State aid, the balances would be spent down. Not only would this have an impact on the third factor effect but it would also result in a generally higher level or per capita expenditure—thereby increasing the level of the 90th percentile. However, this would tend to stabilize in a few years and, since the purpose of State revenue sharing is to assure adequate public services in New Mexico municipalities, a modest rise in the level of per capita spending would be all to the good.

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[4] Ten percent is taken to be the amount needed for cash flow purposes. Revenues to municipalities are received monthly or quarterly. The property tax represents a small proportion of municipal budgets.

Details of the distribution are given for each municipality in Appendix A and the basic data used in the formula are given in appendix B.

SOURCES OF DATA

The population and income estimates contained in the formula were made by the U.S. Bureau of the Census for the Federal general revenue sharing program. Population estimates (adjusted by the New Mexico Bureau of Business Research) are for calendar year 1974 and per capita personal income for calendar year 1973. These estimates will be up-dated every second or third year. The general fund balance was taken from the audits of each municipality on file with the State Auditor's Office. The per capita gross receipts tax amounts were taken from the *Annual Report* of the New Mexico Local Government Division. Per capita income is one of the best over-all measure of a city's ability to finance an adequate level of services. The per capita gross receipts tax is the major single revenue source for most municipalities and is a good, specific indicator of ability to finance. A third factor, assessed valuation, would add significantly to such a formula. However, this is not usable because the assessed-to-market-value ratios vary too widely across the State. In its most recent "Assessment/Sales Ratio Study" (March, 1975), the Property Tax Department shows the ratio to vary (after adjustment for the one-third rule) from 11.9 percent in Taos County to 52.4 percent in Harding County. The report points out that the sample size is inadequate in most cases and that the ratios cannot be used to equalize assessments among counties. However, using unadjusted assessed valuation in the proposed distribution formula would reward cities with the lowest assessments with respect to market value.

APPENDIX A

PROPOSED 3-FACTOR FORMULA FOR NEW MEXICO MUNICIPALITIES

[Distribution—90th percentile]

Place	Maximum eligibility	Present spending	Total distribution	Per capita distribution	Percent of State total
Cities with 1974 population of less than 1,000:					
Total	$118.97	$65.63	$372,067.06	$18.70	3.0973
Capitan	69.48	49.49	7,490.56	13.87	0.0624
Causey	79.34	39.63	0	0	0
Chama	58.90	60.07	0	0	0
Cimarron	84.98	33.99	103,462.81	108.91	.8613
Cloudcroft	0	130.66	0	0	0
Columbus	72.54	46.42	0	0	0
Corona	80.56	38.41	0	0	0
Cuba	0	158.61	0	0	0
Des Moines	48.27	70.70	0	0	0
Dexter	75.60	43.36	74,061.81	93.75	.6165
Dora	103.27	15.69	0	0	0
Elida	69.65	49.32	0	0	0
Encino	54.85	64.12	0	0	0
Estancia	66.95	52.01	0	0	0
Floyd	97.91	21.06	0	0	0
Folsum	59.19	59.77	0	0	0
Grady	67.81	51.15	0	0	0
Grenville	113.37	5.60	0	0	0
Hatch	35.78	83.18	0	0	0
Hope	57.92	61.04	0	0	0
House	67.83	51.13	0	0	0
Jemez Springs	44.95	74.01	0	0	0
Lake Arthur	101.36	17.60	0	0	0
Logan	48.75	70.22	0	0	0
Magdalena	64.38	54.59	4,280.50	6.59	.0356
Maxwell	83.73	35.23	0	0	0
Melrose	73.34	45.62	0	0	0
Moriarity	0	118.97	0	0	0
Mosquero	101.15	17.81	0	0	0
Pecos	77.08	41.89	0	0	0
Red River	0	287.18	0	0	0
Reserve	104.99	13.98	0	0	0
Roy	91.28	27.69	0	0	0
Ruidoso Downs	0	119.70	0	0	0
San Jon	66.02	52.95	0	0	0
San Ysidro	84.07	34.90	0	0	0
Tatum	31.97	85.99	22,016.59	22.70	.1833
Texico	54.59	64.38	62,309.71	75.07	.5187
Tijeras	101.65	17.31	0	0	0
Vaughn	34.17	84.80	19,721.96	22.93	.1642
Virden	111.96	7.01	20,224.26	118.97	.1684
Wagon Mound	92.20	26.77	0	0	0
Willard	82.15	36.82	26,610.36	115.70	.2215
Williamsburg	49.47	69.50	31,838.68	75.93	.2655

APPENDIX A—Continued

PROPOSED 3-FACTOR FORMULA FOR NEW MEXICO MUNICIPALITIES—Continued

[Distribution—90th percentile]

Place	Maximum eligibility	Present spending	Total distribution	Per capita distribution	Percent of State total
Cities with 1974 population of between 1,000 and 10,000:					
Total	105.42	74.74	2,834,656.00	21.35	23.5971
Aztec	55.57	49.84	348,920.50	62.87	2.9046
Bayard	34.02	71.40	0	0	0
Belen	21.48	83.94	128,268.88	23.54	1.0678
Bernalillo	55.59	49.83	241,508.38	87.03	2.0104
Bloomfield	31.68	73.74	74,793.81	35.62	.6226
Bosque Farms	97.28	8.14	0	0	0
Carrizozo	47.55	57.87	90,837.25	74.15	.7562
Central	70.24	35.18	195,024.31	105.42	1.6235
Clayton	5.84	99.58	15,685.90	5.14	.1306
Corrales	68.76	36.65	0	0	0
Deming	48.77	56.65	11,039.54	1.17	.0919
Espanola	0	105.42	0	0	0
Eunice	54.43	50.99	0	0	0
Fort Summer	52.51	52.90	25,135.06	15.01	.2092
Grants	31.50	73.92	153,952.06	18.55	1.2816
Hagerman	70.03	35.39	105,418.56	105.42	.8776
Hurley	25.23	80.19	0	0	0
Jal	59.18	46.23	0	0	0
La Mesilla	59.85	45.57	0	0	0
Lordsburg	18.69	86.73	20,039.29	5.14	.1668
Los Lunas	0	162.79	0	0	0
Loving	61.51	43.91	123.866.81	105.42	1.0311
Lovington	38.53	66.89	73,248.69	8.01	.6098
Milan	3.60	101.82	7,239.71	3.76	.0603
Mountainair	53.69	51.72	75,625.06	75.63	.6295
Questa	64.20	41.22	84,632.94	75.23	.7045
Raton	28.58	76.84	196,356.81	25.50	1.6346
Ruidoso	0	150.71	0	0	0
Santa Rosa	15.92	89.50	49,620.57	19.65	.4131
Silver City	14.82	90.60	93,968.38	10.92	.7822
Socorro	25.32	80.10	185,123.81	31.51	1.5411
Springer	27.06	78.36	55,360.48	38.18	.4608
Taos	0	169.24	0	0	0
Truth or Consequences	15.46	89.96	66,569.63	11.73	.5542
Tucumcari	44.76	60.66	412.429.50	52.54	3.4333
Tularosa	46.93	58.49	0	0	0
Cities with 1974 population of more than 10,000:					
Total	112.36	73.59	8,805,987.00	26.46	73.3056
Alamogordo	53.63	58.73	1,660,316.00	65.37	13.8213
Artesia	40.20	72.16	71,370.81	6.37	.5941
Carlsbad	48.07	64.28	1,229,669.00	51.45	10.2364
Clovis	48.61	63.74	0	0	0
Farmington	25.87	86.49	456,290.06	16.71	3.7984
Gallup	0	112.36	0	0	0
Hobbs	38.03	74.33	391,622.44	13.84	3.2601
Las Cruces	35.90	76.46	1,689,074.00	40.60	14.0607
Las Vegas	65.65	46.71	1,621,692.00	109.13	13.4998
Los Alamos	0	169.73	0	0	0
Portales	42.73	69.62	694,533.88	63.14	5.7817
Roswell	49.51	62.84	991,421.00	24.72	8.2531
Santa Fe	56.60	55.76	0	0	0
Total for all cities		73.58	12,012,710.00	24.75	100.0000

APPENDIX B

PROPOSED 3-FACTOR FORMULA FOR NEW MEXICO MUNICIPALITIES

Place	1974 population	1974 income			1974–75 gross receipts tax			1973–74 general fund		
		Total	Per capita	Income ratio	Total	Per capita	Gross receipts tax ratio	Total balance	Total expenditures	Spending ratio
Cities with 1974 population of less than 1,000: Total	19,895	$54,859,968	$2,657.48	1.0000	$636,626	$32.00	1.0000	$1,085,049.00	$1,445,586	----------
Capitan	540	1,622,160	3,004.00	.9179	14,760	27.33	1.1707	20,950.00	49,465	$0.4235
Causey	150	509,850	3,399.00	.8113	2,396	15.97	2.0033	8,850.00	4,615	1.9177
Chama	970	3,117,520	3,214.00	.8580	54,539	56.23	.5691	55,878.00	60,089	.9299
Cimarron	950	1,865,800	1,964.00	1.4040	23,253	24.48	1.3073	5,625.00	46,166	.1218
Cloudcroft	540	2,341,980	4,337.00	.6358	29,357	54.36	.5886	43,266.00	91,057	.4752
Columbus	260	692,640	2,664.00	1.0351	4,089	15.73	2.0347	17,884.00	5,868	3.0477
Corona	320	961,280	3,004.00	.9179	4,292	13.41	2.3858	34,226.00	9,496	3.6043
Cuba	580	1,331,100	2,295.00	1.2015	42,437	73.17	.4373	38,794.00	9,496	4.0853
Des Moines	210	573,510	2,731.00	1.0097	3,640	17.33	1.8461	12.538.00	8,737	1.4350
Dexter	790	1,611,600	2,040.00	1.3517	19,630	24.85	1.2878	8,438.00	67,958	1242
Dora	200	679,800	3,399.00	.8113	2,421	12.10	2.6435	75,764.00	2,153	35.1900
Elida	230	781.770	3,399.00	.8113	3,999	17.39	1.8404	33,084.00	11,701	2.8274
Encino	270	616,950	2,285.00	1.2068	1,957	7.25	4.4148	10,891.00	21,117	.5157
Estancia	790	1,461,500	1,850.00	1.4905	21,109	26.72	1.1976	54,290.00	30,257	1.7943
Floyd	250	849,750	3,399.00	.8113	817	3.27	9.7917	3,934.00	2,361	1.6662
Folsum	75	204,825	2,731.00	1.0097	888	11.84	2.7026	2,621.00	2,429	1.0790
Grady	110	372,020	3,382.00	.8153	2,749	24.99	1.2804	2,488.00	0	----------
Grenville	20	54,620	2,731.00	1.0097	208	10.40	3.0769	0	0	----------
Hatch	920	3,238,400	3,520.00	.7834	47,119	51.22	.6248	74,133.00	100,220	.7398
Hope	90	301,410	3,349.00	.8234	552	6.13	5.2173	4,929.00	3,322	1.4837
House	120	377,160	3,143.00	.8773	2,878	23.98	1.3342	15,764.00	4,105	3.8402
Jemez Springs	500	1,147,500	2,295.00	1.2015	12,814	25.63	1.2486	31,246.00	40,050	.7802
Lake Arthur	320	862,080	2,694.00	1.0236	837	2.62	12.2339	6,921.00	5,157	1.3421
Logan	400	1,257,600	3,144.00	.8771	14,353	35.88	.8918	44,924.00	46,989	.9747
Magdalena	650	1,477,450	2,273.00	1.2131	20,176	31.04	1.0309	30,513.00	65,827	.4635
Maxwell	410	1,293,550	3,155.00	.8740	4,686	11.43	2.7998	78,263.00	7,751	10.0971
Melrose	690	2,048,610	2,969.00	.9288	13,173	19.09	1.6761	24,658.00	21,024	1.1728
Moriarity	830	2,245,980	2,706.00	1.0190	38,925	46.90	.6823	40,091.00	95,925	.4179
Mosquero	230	721,970	3,139.00	.8785	1,697	7.38	4.3370	9,093.00	4,864	1.8694
Pecos	660	1,623,600	2,460.00	1.1209	12,986	19.68	1.6263	64,986.00	30,468	2.1329
Red River	250	653,000	2,612.00	1.0557	54,123	216.49	.1478	1,930.00	105,826	.0182
Reserve	440	1,223,640	2,781.00	.9915	4.351	9.89	3.2360	0	0	----------
Roy	440	1,381,160	3,139.00	.8785	11,136	25.31	1.2643	72,518.00	20,428	3.5499
Ruidoso Downs	860	1,849,860	2,151.00	1.2819	43,531	50.62	.6322	33,463.00	127,460	.2625
San Jon	310	974,330	3,143.00	.8773	11,964	38.59	.8291	28,415.00	18,509	1.5352
San Ysidro	250	573,750	2,295.00	1.2015	5,309	21.24	1.5068	25,177.00	6,783	3.7118
Tatum	970	3,333,890	3,437.00	.8023	47,903	49.38	.6480	8,887.00	81,978	.1084
Texico	830	2,089,110	2,517.00	1.0955	16,049	19.34	1.6549	5,441.00	62,959	.0864
Tijeras	170	699,210	4,113.00	.6704	2,761	16.24	1.9703	0	0	----------
Vaughn	860	2,205,040	2,564.00	1.0755	27,029	31.43	1.0811	26,266.00	107,859	.2435
Virden	170	586,160	3,448.00	.7997	696	4.09	7.8159	0	2,765	0
Wagon Mound	620	866,760	1,398.00	1.9724	6,008	9.69	3.3022	16,759.00	29,711	.5641
Willard	230	755,550	3,285.00	.8394	844	3.67	8.7202	1,887.00	4,938	.3821
Williamsburg	420	1,424,640	3,392.00	.8129	2,185	5.20	6.1509	9,258.00	28,603	.3237

Cities with 1974 population of between 1,000 and 10,000:										
Total	132,755	470,821,376	3,546.51	1.0000	6,225,105	46.89	1.0000	3,894,916.00	19,525,184	----------
Aztec	5,550	21,339,744	3,845.00	.9224	172,867	31.15	1.5055	59,191.00	465,181	.1272
Bayard	2,900	9,195,900	3,171.00	1.1184	82,145	28.33	1.6554	159,766.00	274,001	.5816
Belen	5,450	17,140,240	3,145.00	1.1277	240,184	44.07	1.0640	35,003.00	577,149	.0624
Bernalillo	2,775	7,165,050	2,582.00	1.3736	54,449	19.62	2.3898	33,052.00	197,703	.1672
Bloomfield	2,100	6,129,900	2,919.00	1.2150	95,283	45.37	1.0335	−3,379.00	271,069	−.0125
Bosque Farms	2,500	9,665,000	3,866.00	.9174	25,132	10.05	4.6645	0	0	----------
Carrizozo	1,225	3,180,100	2,596.00	1.3662	32,770	26.75	1.7529	9,795.00	421,247	.0233
Central	1,850	4,743,400	2,564.00	1.3832	12,537	6.78	6.9195	8,939.00	61,239	.1460
Clayton	3,050	8,326,500	2,730.00	1.2991	129,367	42.42	1.1055	88,069.00	425,866	.2068
Corrales	2,000	8,878,000	4,439.00	.7990	28,732	14.37	3.2641	51,304.00	81,648	.6284
Deming	9,400	24,910,000	2,650.00	1.3383	406,868	43.28	1.0834	346,391.00	703,982	.4520
Espanola	5,600	17,444,000	3,115.00	1.1385	398,825	71.22	.6584	41,572.00	744,890	.0558
Eunice	2,650	10,051,450	3,793.00	.9350	179,277	67.65	.6931	187,644.00	170,393	1.1012
Fort Sumner	1,675	3,050,175	1,821.00	1.9476	40,918	24.43	1.9195	61,915.00	140,433	.4409
Grants	8,300	67,661,600	8,152.00	.4351	493,245	59.43	.7891	115,186.00	1,000,174	.1152
Hagerman	1,000	2,323,000	2,323.00	1.5267	1,739	1.74	26.9647	−555.00	65,234	−.0085
Hurley	1,700	6,754,100	3,973.00	.8927	134,892	79.35	.5910	162,769.00	120,862	1.3467
Jal	2,825	12,339,600	4,368.00	.8119	130,480	46.19	1.0152	708,479.00	341,618	2.0739
La Mesilla	1,850	5,067,150	2,739.00	1.2948	28,884	15.61	3.0034	60,967.00	68,610	.8886
Lordsburg	3,900	12,402,000	3,180.00	1.1153	176,918	45.36	1.0337	258,284.00	649,551	.3976
Los Lunas	1,025	2,942,775	2,871.00	1.2353	139,796	136.39	.3438	92,016.00	244,475	.3764
Loving	1,175	2,184,325	1,859.00	1.9078	12,075	10.28	4.5630	6,943.00	60,394	.1150
Lovington	9,150	35,117,696	3,838.00	.9241	644,901	70.48	.6653	362,516.00	916,807	.3954
Milan	1,925	6,163,850	3,202.00	1.1076	91,850	47.71	.9828	11,775.00	255,008	.0462
Mountainair	1,000	2,359,000	2,359.00	1.5034	21,220	21.22	2.2098	8,882.00	45,188	.1966
Questa	1,125	3,037,500	2,700.00	1.3135	38,055	33.83	1.3862	8,607.00	56,334	.1528
Raton	7,700	26,919,200	3,496.00	1.0145	330,992	42.99	1.0909	125,484.00	779,647	.1609
Ruidoso	3,150	14,162,400	4,496.00	.7888	292,779	92.95	.5045	98,169.00	576,357	.1703
Santa Rosa	2,525	6,352,900	2,516.00	1.4096	111,730	44.25	1.0597	97,010.00	5,165,662	.0188
Silver City	8,605	31,494,288	3,660.00	.9690	579,560	67.35	.6962	166,612.00	1,140,971	.1460
Socorro	5,875	18,617,872	3,169.00	1.1191	201,076	34.23	1.3701	29,180.00	848,672	.0344
Springer	1,450	4,062,900	2,802.00	1.2657	41,452	28.59	1.6403	12,945.00	116,034	.1116
Taos	3,050	9,067,650	2,973.00	1.1929	318,084	104.29	.4496	141,469.00	611,143	.2315
Truth or Consequences	5,675	20,356,224	3,587.00	.9887	164,000	28.90	1.6226	152,643.00	570,412	.2676
Tucumcari	7,850	22,537,344	2,871.00	1.2353	330,945	42.16	1.1123	70,435.00	1,218,734	.0578
Tularosa	3,175	7,680,325	2,419.00	1.4661	41,078	12.94	3.6244	125,238.00	138,549	.9039
Cities with 1974 population of more than 10,000:										
Total	332,760	1,316,834,560	3,957.31	1.0000	16,925,664	50.86	1.0000	8,430,794.00	31,030,048	----------
Alamogordo	25,400	95,961,200	3,778.00	1.0475	880,994	34.68	1.4665	228,477.00	2,037,557	.1121
Artesia	11,200	39,636,800	3,539.00	1.1182	649,000	57.95	.8778	464,435.00	1,064,100	.4365
Carlsbad	23,900	91,226,288	3,817.00	1.0368	1,101,333	46.08	1.1038	150,740.00	2,125,999	.0709
Clovis	33,100	119,888,192	3,622.00	1.0926	1,356,874	40.99	1.2408	4,137,729.00	1,977,447	2.0925
Farmington	27,300	120,229,200	4,404.00	.8986	2,246,951	82.31	.6180	645,137.00	4,052,472	.1592
Gallup	15,300	71,435,696	4,669.00	.8476	1,292,158	84.45	.6023	−160,437.00	3,044,921	−.0527
Hobbs	28,300	123,925,696	4,379.00	.9037	2,275,784	80.42	.6325	895,824.00	2,885,191	.3105
Las Cruces	41,600	151,548,800	3,643.00	1.0863	1,799,837	43.27	1.1756	−62,626.00	5,486,007	−.0114
Las Vegas	14,860	35,961,200	2,420.00	1.6353	447,381	30.11	1.6895	47,362.00	1,322,851	.0358
Los Alamos	15,900	105,337,488	6,625.00	.5973	545,856	34.33	1.4816	511,960.00	2,589,405	.1977
Portales	11,000	30,008,000	2,728.00	1.4506	371,931	33.81	1.5043	0	745,897	0
Roswell	40,100	147,728,400	3,684.00	1.0742	1,575,501	39.29	1.2946	1,120,148.00	3,380,382	.3314
Santa Fe	44,800	183,948,800	4,106.00	.9638	2,382,066	53.17	.9566	452,045.00	317,885	1.4220

PART III: ORGANIZATION

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PUBLIC CHOICE THEORY: RESEARCH ISSUES FOR NONMETROPOLITAN AREAS

[By Robert L. Bish*]

Presenting, understanding, and discussing theoretical frameworks when participants think in terms of their own internalized paradigms is difficult even when there is a sharing of disciplinary backgrounds. In past presentations to groups of Landgrant based researchers I have emphasized the similarities between economic theory and public choice. In this presentation I am going to focus directly on implications of the public choice approach for researching questions of public sector organization and service delivery—with special reference to issues that may best be researched in nonmetropolitan areas. I also devote relatively more space to issues of intergovernmental relations and the concept of public service industries than I have in past work. These latter topics are relatively new areas and neither theory nor research is well developed. These are also the areas where I hope I will present enough to stimulate your own thinking for innovations in theory and research because so much remains undone.

Because I want to treat several issues in this single paper, the description of the fundamentals of public choice theory and the logical derivations of research questions has been greatly truncated. References to fuller treatments of particular issues are provided, and any scholar undertaking research on issues raised here would find it worthwhile to seek out those references and communicate with their authors to become aware of current research and writing that is not yet widely circulated. I do want to emphasize that my presentation will describe a public choice approach that is much narrower in scope than the use of the term to apply to anything involving both public and choice. Some economists, for example, refer to any analysis involving public goods as public choice, and some political scientists have labeled all economists as public choice analysts. My presentation will be confined to the institutional analysis aspects of public choice as represented in the work of the Ostroms, myself, and many of our students.

FUNDAMENTALS OF PUBLIC CHOICE THEORY (2, 5, 14)

Individuals

Public choice begins with a focus on individuals. Individuals are assumed to possess preferences and make choices which they feel will enhance their well being. Individuals function in a complex environment where knowledge is costly and the implications of many choices are uncertain. Individuals are also assumed to be diverse; that is, different individuals possess different skills and have different preferences. We believe that public choice theory is a very humanistic social science—treating people as feeling, thinking, choosing, and learning.

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This view of individuals has two important implications. First, we prefer evaluations to be in terms of effects on individuals—not effects on organic units such as communities, cities, or nations. We accept that other analysts have different preferences, and know of no method to determine which is a better approach. Second, we prefer, *ceterus paribus*, to be able to relate outcomes from institutional arrangements to incentive and choice situations faced by individuals. While this preference is a strong one, there are some important areas of research where organizational and system characteristics are of sufficient overriding importance that relationships to individuals are being neglected—at least for the time being.

Goods and Services

Individuals have preferences for goods and services. Goods and services, however, are diverse. Some are packageable, that is the benefits and costs of their production, exchange, and consumption are borne or realized by direct participants. Others possess characteristics of public goods or common pool resources, where individuals other than those involved in production, exchange, or consumption are affected—and where collective decision-making is often a prerequisite for efficient management or provision.

Other characteristics of goods and services which appear significant for relating them to individual preferences and organizational structures include ease of measurement, capital or labor intensive production, and personal face-to-face or impersonal provision to consumers. For example, at one extreme, water provision is measureable, capital intensive, and provided impersonally, and the organizational arrangements for its provision may be quite different from those for education, which is hard to measure. labor intensive, and provided through personal face-to-face interactions.

Organizations and Decision-Rules

Organizations and decision-rules are the institutional framework within which individuals pursue their preferences for goods and services. Decision-rules encompass all aspects of rights and regulations, including such things as private property rights and rules under which public officials operate. What is important about public choice analysis is that it includes analysis of the entire spectrum of organizations and decision-rules from the operation of purely competitive markets through bureaucracies, voting, and different bargaining situations. Much of the analysis focuses on inter-governmental relations—which involves both understanding the incentive systems within public bureaucracies and the interactions among public and private organizations.

None of the fundamental elements of public choice theory—assumptions about individuals, analysis of the characteristics of goods and services, or analysis of diverse organizations and decision-rules is unique to public choice approaches. What characterizes public choice is the analysis of how different kinds of organizational structures and decision rules are systematically related to individual choices to obtain goods and services possessing different characteristics. Hence both market economics and the theory of public goods can be viewed as subsets of public choice. In general we are asking the same question as asked by Adam Smith—can institutional constraints be such that individuals seeking their own self interest also produce benefits for others? However, we want to go beyond Adam Smith and ask the same question of those who make and administer laws as well as those who function within what is generally called the private sector.

PUBLIC CHOICE AND "GOVERNMENT" ORGANIZATION

Direct Implications

Analysis of the basic elements of public choice theory—individuals, goods and services, and organizational arrangements—does have direct implications for the analysis of governmental systems. The assumption that individuals have preferences, but not necessarily the same preferences as other individuals, leads us to infer that the same level or kind of governmentally provided goods and services will not satisfy everyone equally. Hence we should be aware that different kinds and levels of goods and services may reflect different preferences of individuals as well as differences in organizational arrangements. Our assumption that individuals make choices to make themselves better off also implies self-interested behavior—hence the specific concern that individuals be rewarded for behavior that simultaneously benefits rather than harms other individuals. There is an *a priori* bias against placing some individuals in positions as monopolists *vis a vis* other individuals out of an expectation that individuals will use monopoly positions to enhance their own welfare at the expense of others. This concern is applicable to government organization as well as the organization of private markets.

The recognition that goods and services have different characteristics and that different organizational arrangements have different characteristics for facilitating coordination among individuals leads us to anticipate that different organizational arrangements will be better suited to provide different goods and services. No single size or kind of organizational arrangements is likely to be appropriate for all activities. The importance of simultaneous consideration of the nature of goods and services and organizational arrangements in public choice is still overlooked by analysts who come from perspectives which focus primarily on either organizations or characteristics of goods. For example, some analysts still attribute to public choice theory the conclusion that small governments are more efficient and responsive than are large governments. No public choice analyst that I am aware of, however, has concluded that small governments (cities or even counties) are more efficient and responsive than a large government for providing air pollution regulation, income redistribution, or—to be extreme—national defense. At the same time public choice analysts have concluded that smaller governmental units may be more efficient and responsive in providing a labor intensive face-to-face service such as police patrol. The point is not whether small or large is "better," it is that organization cannot be evaluated apart from the nature of the goods and services to be provided.

One place where the stress on diversity of both public goods and services and organizational arrangements has sharply distinguished public choice conclusions from traditional political reform approaches is in the debate over the organization of government in metropolitan areas. In this debate, public choice analysts have stressed the diverse characteristics of problems to be regulated and goods for which collective provision is desirable, which in turn implies a need for diverse kinds of governmental units, including small governmental units, special districts with boundaries appropriate to the problem addressed, *and* large scale governmental units resolve regional problems and assist in setting rules and adjudicating disputes among smaller governmental units. What we find striking about our metropolitan areas is not necessarily too many governments or a lack of regional or larger organizations—including State and national governments—but the lack of small governmental units within the older central cities. It is also important to remember, however, that public choice analysts explicitly consider the trade-off between too few governments for resolving diverse problems and too many governments to understand what is going on (21).

There is one other implication that follows from the perspective public choice analysts take toward individuals and the environment individuals function in—although this perspective is perhaps more commonly associated with ecological or systems models, including the study of comparative economic systems, than with contemporary economics or political science. Public choice analysts assume that knowledge is costly and imperfect for everyone—including experts or public choice analysts. There are to very direct implications of an assumption of imperfect knowledge. First, individuals and organizations need to be adaptive to changing environments. Thus emphasis is placed on whether or not responses to incentives are of a kind which might be called self-correcting—or perverse. For example, if police are rewarded for enhancing citizens' sense of security in their neighborhoods we expect improved performance by policemen over time. On the other hand if police are rewarded simply for reducing crime rates in agency statistics they may undertake aggressive patrol and harass citizens to achieve that result. The crime rate will decline but it will be because citizens cease to report crimes for fear of police harassment and actual citizen security within the neighborhood will be less than previously (10). Public choice analysts will often focus on self-correcting tendencies in organizational arrangements as desirable in themselves—especially when actual outputs or satisfaction are difficult to measure or where attempts at measurement may bias the delivery system in undesired ways.

The focus on self-correcting organizational arrangements has given rise to the few rules of thumb or normative criteria for evaluating institutional arrangements in the abstract that exist within the public choice framework. This is the ideal of "fiscal equivalence," first presented in relation to metropolitan areas in the 1961 Ostrom-Tiebout-Warren article and given additional visibility by Mancur Olson in the 1969 *American Economic Review*. Very simply, self-correcting tendencies are expected when the individuals benefited by public policies (managing common pools, providing a public good, etc.) simultaneously influence the decision on those policies and pay the costs. This criterion simply generalizes the equilibrating nature of a quid-pro-quo exchange in perfectly functioning markets to trying to relate benefits, decisionmaking and costs when a group rather than a single individual is involved. Use of this criterion is certainly one reason why public choice analysts have been more favorably disposed to special districts, special assessments, and earmarked taxes than are analysts who believe all revenues should go into a single general treasury to be dispensed in relation to policies decided where relationships between benefits and costs have been eliminated.

To go further in deriving implications of public choice theory for governmental organization requires increasing amounts of empirical evidence. Public choice theory is not an approach whereby problems can be resolved by cranking through a particular logic. Instead, the theory is begun at a fairly high level of abstraction and has few determinant conclusions without additional evidence or the need for additional assumptions which themselves have been examined empirically.

Research Approaches

There are several ways a body of theory can assist empirical research. Three of these ways include designing research to compare hypotheses derived from alternative theories to see which theory yields better predictions, designing research to test hypotheses derived from a particular theory, and using theory as a framework for analysis of complex empirical phenomenon. This latter use of theory does not result in an explicit test of theory, but having some systematic guidelines when examining complex systems is itself important. Researchers have utilized public choice theory extensively in all three ways.

One of the best ways to develop theory is by hypotheses from alternative paradigms simultaneously. This is because in dealing with public policy the choice is not between a prediction based on a tested theory and no prediction—but rather the choice of a prediction, often in a time frame too brief to gather much empirical information. The policy environment is one where the development of paradigms or a way of thinking that lets one focus quickly on critical elements to make predictions is crucial and systematic testing of competing theories is more likely to advance the state of the art than is isolated testing of hypotheses derived from a single paradigm. Elinor Ostrom (11) has explained and illustrated the fruitfulness of this approach and if you are not familiar with her work in this area, I recommend it to you. In addition, there has been sufficient research on elements of public choice theory to warrant its use as a guide for understanding complex phenomenon left unexplained by alternative approaches. The coastal resource use study by a team from the University of Washington (6) is an example of this use of public choice theory—and much of its analysis focuses on public decisionmaking in nonmetropolitan areas.

There are several characteristics of nonmetropolitan governmental systems that are important for applications of public choice theory—and I expect applications of other approaches to understanding governmental systems. First, nonmetropolitan areas are similar to suburban areas in having many relatively small and overlapping governmental units. This system differs from suburban areas, however, in that most small rural governments contain relatively heterogeneous populations and land uses relative to suburban governments, which are often specialized by function or homogeneous in terms of charactertistics of their residents. The nonmetropolitan system also differs in that population concentrations are widely dispersed and there appears to be a greater diversity of overlapping in nonmetropolitan areas. Measures of governments per capita, for example, are always highest in rural rather than metropolitan areas. Finally, in nonmetropolitan areas the Federal government appears to play a larger role relative to other governmental units than in urban areas—and I am sure many of you know the history of the Federal role in rural areas much better than I do.

Some of these characteristics permit testing of hypotheses from public choice theory which are difficult to test in metropolitan areas. Others—especially the high level of complexity—suggest areas where public choice theory may be used as a framework guiding empirical analysis to obtain a better understanding of the operation of the system prior to more systematic hypotheses testing.

STUDIES OF INDIVIDUAL GOVERNMENTS

Homogeneity of the Population

Comparisons of performance of governments in metropolitan areas has indicated higher levels of citizen satisfaction with many functions in smaller governmental units, usually suburban, than are expressed by central city residents. Within public choice theory, two hypotheses would generate this expectation. One, higher levels of satisfaction would be expected where the population influencing policy and receiving a common kind or level of service is homogeneous rather than heterogeneous. The other is that, because diseconomies of scale for many functions begin at relatively small population sizes, small governments may provide *some* services more efficiently than large governments. Careful examination of the performance of small nonmetropolitan governments which contain heterogeneous populations should permit separation of the heterogeneity-homogeneity hypotheses from size hypotheses in understanding the performance of suburban governments relative to large cities. Many public goods are said to possess characteristics that must be the same for everyone. If so, how are the diverse preferences of heterogeneous populations in small towns accommodated—or are significant proportions of small town residents dissatisfied with the performance of their governments? Where there is satisfaction is it a consequence of lower expectations or accommodations made by the producing organizations? Have the accommodations raised the costs or production? Does the small size simultaneously permit differentiating public goods and services to fit different preferences in ways that large bureacratic organizations are uncapable of accomplishing? These questions are not simple to answer. But comparative performance of small homogeneous governmental units in the fringes of metropolitan areas with small heterogeneous governments—which are more common in nonmetropolitan areas—can be studied to improve our knowledge of the importance of homogeneity and how to accommodate heterogeneity.

This is certainly an issue of importance in metropolitan areas as well as nonmetropolitan areas.

Production with Spatial Separation

A second area for important research is related to the relative separation of nonmetropolitan population centers and their local governments from one another. In metropolitan areas small governments utilize intergovernmental arrangements for the production of goods and services, or more commonly, particular components of goods and services where economies of scale exist or peak load problems occur. It is assumed that spatial separation makes some kinds of intergovernmental agreements more difficult for nonmetropolitan government. If so, how do small nonmetropolitan governments accommodate peak load problems or provide services where it is commonly thought that economies of scale exist. For example, can lack of economies of scale in police dispatching, fire dispatching, and operation of detention facilities be overcome by having a single individual dispatch for both fire and police while looking after the jail—and, if so, are there identifiable service quality differences relative to areas where larger scale governments operate? Another important question, especially for dealing with peak load problems, is the extensiveness of volunteerism in providing local government services in nonmetropolitan areas. And, where volunteers are utilized, what are the differences in costs and performance, with performance measured in terms of outputs—not in terms of the "professionalization" of the inputs as is so popular in many functions.

Questions of economies of scale for functions and activities within functions are important because we need to identify what characteristics of goods and services are associated with different scales of efficient production. It appears that some important characteristics are the ease or difficulty of measuring outputs (harder measurement makes management of large organizations more difficult), capital intensiveness or labor intensiveness (capital intensiveness implies easier manageability and economies of scale through spreading overhead.) These characteristics represent extreme cases however, and we have a lot to learn about relationships between scale, efficiency, and responsiveness in providing government goods and services.

STUDIES OF THE NONMETROPOLITAN PUBLIC ECONOMY

The focus on diversity in the characteristics of public goods and services and the organizational arrangements by which they are likely to be responsively and efficiency provided makes the analysis of interorganizational and intergovernmental relations a critical component of public choice approaches to understanding the operation of the public economy. An expectation of diversity and a consequent need for interorganizational coordination, however, does not in itself provide guidelines for understanding or making predictions of consequences to be anticipated from changes in the organization of the public sector. At the same time, approaches to the analysis of the public sector which refer to systems containing many units of government as chaotic or non-systems do not provide adequate frameworks for understanding the public sector; there are too many examples of systematic interorganizational interactions in the public sector to accept such a conclusion without attempts at more sophisticated analysis.

Systematic research on public service industries using public choice theory is in an earlier stage of development than studies of single governmental units—yet there are strong reasons to believe that the intergovernmental environment within which a single political unit functions is an important influence on that units performance. The public economy of nonmetropolitan areas, with its more numerous political units per capita, but fewer total units, should provide a research environment where the sheer size of the system does not pose as difficult (and as costly) a research environment as do metropolitan areas.

Public choice scholars have begun analysis of systems of government with two approaches: one uses the concept of a public service industry and attempts to identify the relationship between how the industry is organized and the performance of that industry as measured by a variety of indicators (1, 15). A second is to classify kinds of intergovernmental relations in terms of their effects on performance indicators—especially responsiveness and efficiency to citizens (4). The classification of kinds of intergovernmental relations uses the agreements as units of analysis, the industry approach uses the public service industry as its primary unit of analysis. As these kinds of research advance, it should be possible to relate the incentives policymakers face which encourage different kinds of intergovernmental relations—and hence integrate the focus on individuals operating within identifiable organizational and decision-rule frameworks into the focus on intergovernmental relations. At the same time, it should be possible to relate kinds of intergovernmental relations to their position within the industry structure—and hence develop better hypotheses to classify particular intergovernmental relations prior to actual analysis of their importance. Relating kinds of intergovernmental relations to industry structure and performance would then fill out the public choice paradigm to relate individuals, goods and services, and organizations and decision rules, even though research on specific problems would use different basic units of analysis—including individual transactions among organizations or public service industries—depending on the specific problem under analysis. It is my current belief that this framework is rich enough to provide guidlines for empirical analysis and ultimately provide rules of thumb for making preliminary predictions of the consequences of specific organizational or industrial organization changes. Before *a priori* predictions will be possible, however, a considerable amount of empirical research must be undertaken. In this presentation I will simply sketch the outlines of approaches to analyzing intergovernmental relations and industrial structures.

Kinds of Intergovernmental Relations

Intergovernmental relations take many forms and no classification scheme will capture all of their attributes. The characteristics I am going to focus on here, however, seem to raise our understanding of the consequences of intergovernmental relations for citizen satisfaction with the performance of the system—and hence fall within our interest in effects on individuals even though the focus is on organizations and the public service industry within which they operate.

Cooperation.—Cooperation is a term generally used to describe joint action by two or more parties for mutual benefit. The benefit can accrue from jointly seeking a common objective or from entering into an exchange agreement. Most of the analysis of intergovernmental relations appears to focus directly on cooperation, including joint powers agreements, grants, service contracts, mutual aid agreements, and so on. What is important to realize about the term cooperation is that it describes a relationship between two or more directly involved parties and *implies no reference to third parties* who may be benefited or harmed by the cooperation. Of equal importance for understanding the effects of intergovernmental relations, however, are the effects on third parties.

Our vocabulary lacks, in so far as I am aware, a term to describe cooperation between two parties which simultaneously benefits third parties. For example, a police department contracting for laboratory services or detention facilities may make citizens better off by providing them with police services at lower costs. This kind of cooperation is like a market transaction between retailers, wholesalers, and producers to provide consumers with goods efficiently.

Collusion.—There is a term that comes close to describing cooperation which provides net benefits to the cooperating parties, but simultaneously imposes costs on third parties. This term is "collusion." Examples of collusion include price fixing, exclusive franchising, fair trade laws, and such things as refusal of a district attorney to question police violations of civil rights, or a court's assumption that all defendants brought before it by the prosecuting attorney are guilty. Even "collusion" however, is not really a precise term for describing many cooperative agreements which generate negative consequences for third parties because collusion implies secrecy or conspiratorial motives to injure third parties when many cooperative agreements, especially in the public sector, may generate unintended rather than planned negative consequences for others.

Competition.—Closely related to the concepts of cooperation and collusion is the concept of competition. Competition is rivalry between two or more parties for the favors of a third party, or in some cases for the capture of an object for which no party has a property right. Competition other than that for an unowned object describes a relationship which has reference to a minimum of three parties, where two parties compete to cooperate with the third. Competition and cooperation are closely related because cooperation always implies competition in the sense that to enter into an agreement with another party means that the other party's offer was superior to any competing alternatives, and choice from among competing alternatives is always necessary in a society characterized by scarcity of resources. Collusion is related to competition because collusion is often undertaken by potential competitors to eliminate the competition for favors of a third party.

Coercion.—The term "coercion" refers directly to a minimum of two parties, but it implicity implies that the coerced party has no option but to meet the preference of the coercing party or bear some sanction imposed by that party. Coercion can also be viewed as an exchange where the coercing party says if you give me a "good"

I will not give you a "bad" instead of an exchange of "goods" between two parties.

Examples of cooperation with benefits to third parties, collusion, competition, and coercion abound in the public as well as private sector. For example, HEW provides grants for cancer research to some hospitals and not others, but other foundations also provide grants for cancer research, so hospitals not receiving aid from HEW are not foreclosed from cancer research. At the same time, researchers can choose to seek funds for cancer research or even switch to research on diabetes. Another example would be when elected officials organize and direct police patrol services, but permit the police department to enter into service contracts for the provision of dispatching and traffic control services. Among the competing alternatives consumers possess are alternative elected officials; alternative residential locations, or calling upon the county sheriff. Competing alternatives for the police department for obtaining dispatching and traffic control services include provision of the services itself, entering into a joint dispatching agreement with the fire department, or contracting with a different dispatching agency. Likewise, traffic control may be changed to the engineering department, or contracted to the sheriff or the state patrol. If we look closely we discover that the public sector is filled with cooperative agreements from competing alternatives.

Collusive agreements also exist in the public sector. For example if the city police and county sheriff agree to stay out of each other's territory, even if they may legally operate within cities or pursue beyond their boundaries, a citizen's options for calling upon either of two police departments instead of only one is eliminated. And finally, coercion is often used by governmental agencies where sanctions such as fines or jail are used to encourage individuals to pay their taxes and obey laws. The extent to which a government may coerce a person depends on that person's options for moving to the jurisdiction of another government—an observation that is as true for national governments as it is for local political units. Coercion may also be directed by one governmental unit against another as when a State government unilaterally imposes requirements for expenditures on a local political unit.

An approach to analyzing intergovernmental relations which takes into account the variety of potential intergovernmental agreements and both positive and negative effects on third parties is necessary to understand effects on people. In many analyses, however, cooperation *per se* is treated as desirable, especially the type of cooperation that I have called collusion. One example of this kind of interpretation is Sundquist's (20) criticism that OEO and Model Cities agencies were failures because they did not create a single cooperative, i.e., collusive agency to undertake all policymaking for citizens in OEO and and Model Cities areas. In contrast, the interpretation that a public choice analyst would draw is that the creation of OEO and Model Cities agencies had impact precisely because they provided a competing alternative to traditional city government for citizens whose interests were neglected (3). The public choice conclusions are also consistent with those of other analysts of OEO and Model Cities programs (8, 17).

A priori, it is often difficult to predict whether or not a particular intergovernmental agreement will benefit or harm third parties. Empirical examination of intergovernmental relations is necessary to build up knowledge in this area. Hypotheses concerning likely effects on third parties, however, are more easily developed if intergovernmental relations are placed in the context of a public service industry.

Public Service Industries

Public service industries are the network of organizations through which decisions are made and particular governmental services such as police services, water services, or education are provided. While the industry idea is a simple one, analyses utilizing public service industry frameworks have provided important concepts, a method to empirically operationalize the concept, specific hypotheses for testing, and an example of a research strategy with a potential for really increasing our understanding the relationships between the organization of the public sector and its performance.

Important concepts include a classification of organizations in relation to specific roles within the industry. This classification includes consumption units, producers of direct services, and producers of indirect services. Consumption units are units through which citizens articulate their demands and through which decisions are made on the provision of public goods or services. They are often basic political units such as cities or counties. Producers of direct services are those organizations which provide services directly to citizens. They are often departments or bureaucracies organized as part of the government (which is simultaneously the collective consumption unit), but producers can also be separate public or private organizations operating under contract to the consumption unit. Producers of direct services are analogous to retailers in markets. Producers of indirect services are organizations providing services to the producers of direct services. Producers of direct services receive indirect services either from units of their own organization or under contract with other organizations. Producers of indirect services perform roles like wholesalers or manufacturers who do not sell directly to consumers in private markets. A public service industry is comprised of the consumption units and producers of direct and indirect services in a particular functional area. For example, the police industry is composed of consumption units making decisions on the police services to be provided to their citizens; and includes cities, towns, port districts, universities, counties, States, and so on. Producers of direct services include the organizations providing services directly to citizens, primarily police patrol and traffic patrol. Producers of indirect services include the organizations providing services which are primarily requested by the policemen providing direct services, and include crime laboratory facilities, detention facilities or training programs for policemen. Also included as producers of indirect services are organizations such as detective associations and associations of police chiefs.

The idea of an industry is simple enough, but it must be operationalized for empirical research. The strategy for defining an industry adopted by Elinor Ostrom, Roger Parks, and Gordon Whitaker (12) in a police industry study provides an approach for defining an industry that is theoretically sound and operational for empirical research purposes. This approach begins by defining the *goods and services* provided, then proceeds to identify the organizations making decisions on that provision—these are the consumption units. Then organizations producing the services directly for citizens—these are the producers of direct services—are identified. Finally, organizations providing inputs to the producers of direct services—these are the producers of indirect services—are identified. This approach keeps industry definitions in terms of services as perceived by individuals receiving the services—and ultimately the evaluation of performance of a public service industry must be in terms of its effects on those individuals.

One major empirical application of the industry approach is of the water industry. This is an easy analysis for economists to understand because water is itself produced, wholesaled, and retailed to consumers (13). Of special current interest, however, is the study of the police industry referred to above. The network of providers of police services is commonly referred to as chaotic and a non-system by major analysts and presidential commissions (1, 18, 19)—yet in a careful examination of police services in 80 SMSAs, systematic relationships between consumption units, direct production units, and producers of indirect services are obvious. Should any economist who knows something about economies of scale for providing different kinds of functions, for example, be surprised that in the 80 SMSAs there are 1,287 producers of police patrol but only 230 producers of detention facilities, 213 training agencies, and 83 organizations providing crime laboratories? (13, pp. III-5, 14, 17). No one can read *Policing Metropolitan America* and not believe that there are extensive systematic relationships among a very large number of organizations constituting "the police industry." I also expect that if we began an analysis thinking that coordination occurred only through hierarchial ordering or with a focus on general units of governments such as cities, counties, and States, we too would be unlikely to perceive the systematic nature of the relationships that do exist—and would most likely join those concluding that the police industry is a choatic non-system.

Public service industries can be described in terms of their vertical and horizontal differentiation just as other industries are. Industries where the same organization serves to articulate demands on behalf of consumers, produce direct services, and produce indirect services for itself are described as vertically integrated. Industries with much inter-level cooperation via contracting among independent units would be vertically differentiated. Industries with a single large collective consumption unit would be described as horizontally integrated, while an industry with many consumption units would be horizontally differentiated. The metropolitan police industry for example, may be characterized as vertically and horizontally integrated within the big city areas of an SMSA, but vertically and horizontally differentiated in the parts of the SMSA served by small cities. The degree of vertical or horizontal integration and differentiation should depend on economies of scale in different functions, economies of scale in undertaking multiple functions simultaneously, and a variety of legal and political conditions—not all of which are identified or well understood.

Phillip Gregg (7) has worked through a number of specific hypotheses relating public service industry organizational characteristics with performance on a variety of indicators, and operationalization of industry organizational characteristics is being undertaken in the police services study. A list of Gregg's hypotheses are included as appendix A. If empirically validated in future research, this approach will greatly enhance our understanding of the relationships between the organization of the public sector and its performance.

Problems of Research

Intergovernmental agreements and their effects on third parties and public service industries are both alternative units of analysis, the use of which can expand our capacity to predict the consequences of changes in the organization of governments in nonmetropolitan and metropolitan areas. Research utilizing these approaches, however, is just beginning and research designs are difficult and may be expensive to implement. The existence of fewer smaller political units in nonmetropolitan areas make it an environment where it may be easier to utilize these approaches and learn from their use—prior to extensive use in metropolitan areas—although the police industry study is a major effort to more systematically relate organizations to performance in the public sector. Steps to systematically utilize a public choice framework to analyze the nonmetropolitan public include:

1. Describe the system. Begin with the services provided in a functional area and systematically identify the consumption units. Then identify their operation and intergovernmental relations to identify producers of direct services to citizens. Then proceed to identify the producers of indirect services to the producing agencies.

2. Identify relationships between organizational characteristics and performance.

(*a*) Using public service industries as units of analysis, relate measures of industry characteristics with various indicators of performance—including responsiveness, efficiency, and income redistribution. Phil Gregg's hypotheses and the police industry study's concepts for operationalizing measurements of industry structure are important beginnings for this task.

(*b*) Using intergovernmental relations as units of analysis identify whether consequences of particular kinds of agreements are beneficial or harmful for third parties. In many areas, case studies will be necessary.

(*c*) Relate kinds of intergovernmental relations to the industry structure and see if predictability of consequences is increased.

3. Relate organizational characteristics to constitutional, statutory, and political frameworks under which governmental organizations operate. Manipulation of the constitutional and legal framework is one major way to exercise policy leverage on the performance of public service industries. One must understand how changes in the legal structure effect industrial structure or incentives for intergovernmental relations in order to recommend improvements in public sector performance via organizational change.

4. In order to predict the implications of different legal structures for intergovernmental relations and industry structure, we must also begin to understand the incentives which encourage decisionmakers

in single political units to undertake intergovernmental relations to enhance the performance of their political units *vis a vis* citizens. There are too many examples of contracting for direct and indirect service production to assume that all managers prefer larger organizations to manage, yet hypotheses which would explain the extensive use of intergovernmental contracts remain unexplored in spite of their importance for developing responsive and efficient public service delivery systems.

5. In all of the above approaches, pay particular attention to the impact of short run changes relative to long run changes. Elimination of duplication may raise efficiency in the short run, while the elimination of competing units may reduce incentives for responsiveness and efficiency over a longer time period.

Throughout this discussion of intergovernmental relations and public service industries, little mention has been made of specific roles or analytical approaches utilizing common units of government such as cities, counties, States, and special districts. In spite of volumes of research using these organizations as units of analysis, neither a consistent framework for analyzing their interrelationships nor good empirically based predictive models of their individual performance or the performance of governmental systems has been achieved. From a focus on consumption and production units, both of which include politics, political decisionmaking, and general government units, one should not infer that general governmental units are not important. Rather than assume that general governmental units should possess some kind of monopoly position *vis a vis* other governmental units, however, we prefer to identify the performance of public service industries to obtain a better understanding of the relationship of general governmental units to other governmental and non-governmental units. Only with such information will we be able to really develop rules of thumb for situations where general governmental units may be obviously superior as either consuming or producing units than alternatives. From our perspective the claims of mayors, county commissioners, or governors for control over competing political units in the name of efficiency should be viewed no differently than the claim of any leader of an organization who could lead an easier life if only his competition was eliminated.

CONCLUSIONS

My suggestions for important research are based on implications of public choice theory for understanding the operation of the public economy. While the logic of the hypotheses has been truncated to include more ideas in a single paper, these are areas—especially the relationship between alternative units of analysis such as intergovernmental relations and public service industries and the fundamental focus of public choice theory on individuals—where some analysis and empirical work has already been done. At the same time, they are areas where much remains to be done, both conceptually and empirically. They are areas where implementation of empirical research may be especially appropriate in nonmetropolitan areas. Enough work has been done to demonstrate a high potential for usefulness of these approaches. Work, as yet undone, will determine if such optimism is warranted.

APPENDIX A

Hypotheses on Industry Structures*

1. A greater number of overlapping jurisdictions of different scales and with legal independence (vertical differentiation) in a public service industry is correlated with greater specialization among agencies in production of services and larger numbers of cooperative exchanges among them.
2. Greater specialization and exchange among agencies in a vertically differentiated industry is correlated with greater efficiency and technological innovation in service production.
3. Greater horizontal differentiation of the governmental jurisdictions overlaying a geographic area for a public service industry is correlated with greater diversity in the type, quantity, expenditures, and costs of the public services produced.
4. The latter are correlated with higher levels of citizen evaluations of services and government responsiveness within the geographic area, without respect to aggregate differences among areas in family income and governmental revenues.
5. Greater horizontal and vertical differentiation in a public service industry are jointly correlated with larger fiscal transfers and greater income redistribution among jurisdictions.
6. Greater vertical differentiation without greater horizontal differentiation in a public service industry is correlated with greater equalization of service expenditures.
7. Greater horizontal and vertical differentiation in a public service industry are jointly correlated with greater participation by private firms and voluntary enterprises of associated citizens.
8. The latter are correlated with a larger number of competitive relations among enterprises, greater efficiency, and higher levels of citizen evaluations.
9. Greater horizontal differentiation without greater vertical differentiation in a public service industry is correlated with smaller sized unions and smaller dollar values of services lost in work stoppages.
10. Greater horizontal and vertical differentiation in a public service industry are jointly correlated with greater information on the part of officials and citizens about the costs, quality, availability, and preferences for services.
11. Greater horizontal and vertical differentiation in a public service industry are jointly correlated with larger numbers of specialized decision structures to articulate divergent preferences and to resolve conflicts.
12. Greater horizontal differentiation without greater vertical differentiation in a public service industry is associated with higher frequencies of conflicts among agencies and longer delays in resolution.

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*From: Phillip M. Gregg, "Units and Levels of Analysis: A Problem of Policy Analysis in Federal Systems," *Publius*, Fall 1974, pp.. 79–80.

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HOW COMMUNITIES CHOOSE: A STUDY OF SELECTED TOWN COUNCILS IN WASHINGTON STATE

[By Michael L. Wise and Paul W. Barkley*]

Since the modern science of economics arose during an era of individualism, it is not surprising that the formal study has a strong bias toward the choice patterns of individuals and small units. The logic of choice used by economists works best when one individual is choosing and when that individual has a single-value expectation function. As one moves from this circumstance to a setting in which more than one person is choosing or more than one objective is being sought, the logic can be maintained if and only if an appropriate weighting scheme can be devised for both the choosers and choices to be made. This weighting scheme has defied empiric estimation. Until estimation can be accomplished, the whole area of public choice may remain an ambiguous part of economic science. Publics are groups of persons with different value sets and these publics must always choose collections of public goods. The question is: which collection is best for the present choosing group given that the group has limited means and varied dispositions? The answer is not clear.

In spite of this, publics must choose. The Federal, the State, and local governments must divide their limited revenues among alternative and competing ends. Several expedients such as zero base budgeting, cost-efficiency, and cost effectiveness have been designed to aid in public decisionmaking. But they have been of limited use in helping society choose that mix of public goods and services that actually achieves maximum welfare. To achieve maximum welfare, the very rigid requirements of the marginal conditions must be met; this requires adherence to a very exacting logic. How closely this logic is followed should be a researchable theme; this brief paper reports results of a study designed to ascertain the factors associated with public choosing. The vehicle was 19 town councils in Eastern Washington State.

TOWN COUNCILS

The town council was chosen as the unit of study because it has tasks similar to those faced by both larger and smaller units of government. Its decision processes are not obscured by a heavy overburden of bureaucracy, yet they are complex enough to *resemble* the kinds of processes that must be used by most larger jurisdictional units. Small towns in the State of Washington ordinarily elect 5 councilpersons-at-large for staggered terms of 2 years. The councils meet at periodic intervals. Meetings are presided over by the elected mayor, who generally is elected to serve for 4 years. Although much of the council's work stems from county, State, and Federal regulations, the council also must make decisions about the local ordinances, budgets, capital expenditures, and coordination between the town, and State, and Federal governments.

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Individual council members must gather information, filter, and analyze it, and apply it to the task of getting the most out of the jurisdictional unit's limited revenues. In a strict sense, the officials act as a market for purchasing or rejecting a wide variety of potential mixes of public goods. Their constituents are the demanders and the various town departments are suppliers. The council reads signals and attempts to make decisions about the allocation of budget monies. The study examined council members and mayors in this light. Interviews were conducted with 74 respondents to determine their personal and political characteristics, and the processes by which they made decisions for their towns.

The Towns and Councils in the Study

The 19 incorporated towns selected for study were all in the Eastern half of the State of Washington.[1] Most had economic bases in extractive industries, principally agriculture and forestry. The towns ranged in population from 987 to 4,400 and were at least 30 miles from any population center of 10,000 or greater. Some have grown, some have declined, and some have remained relatively stable in population for the past several years. An effort was made to contact the mayor and each council member in each town. All except one mayor were contacted. The low success rate in some towns was the result of councilpersons being out of town, vacancies on the council, or unwillingness to cooperate.

Personal and Political Characteristics of Elected Officials

About half of the elected officials contacted had resided in their towns for more than 25 years—essentially their entire adult life. However, 48 of the 74 respondents had been in office less than 6 years and only 4 had been in office more than 15 years. Average time in the community was 29 years and the elected officials came from families that ranged in size from 2 to 9 members.

Thirty-three of the 74 respondents were managers, salaried individuals or self-employed. Twenty were retired, 13 were skilled workers, 5 were professionals, and 3 were homemakers. Those serving on councils were active in other civic groups. Some council members belonged to as many as 7 organizations and they averaged membership in 2.8. It was later found that some council members based their public decisions on commitments coming through the organizations to which they belonged. The local organization or club appeared to be a major force in directing public decisions at the local level.

Competition among political aspirants is generally felt to be an important aspect of representative democracy. Rivalries for seats on governing bodies are thought to make officials more responsive to citizens' needs and provide a constraint on behavior. In spite of this, and the fact that individuals in small jurisdictions should find it relatively easy to aspire to public office, 40 of the 74 councilpersons contacted had obtained their positions by running unopposed or by being appointed to their present offices. Nineteen of those holding office ran at the urging of friends, council members, or city employees. There was some indication that recent financial disclosure laws prevented several incumbents from seeking re-election and prevented opposition from developing in many electoral contests.

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[1] The towns are Brewster, Chelan, Chewelah, Connell, Davenport, Dayton, Goldendale, Newport, Odessa, Okanogan, Omak, Oroville, Pomeroy, Quincy, Republic, Ritzville, Tonasket, White Salmon, and Wilbur.

THE DECISION PROCESS

The interview probed 4 areas of the decision process: initiation (problem recognition), information gathering, deliberation, and voting. Additional questions covered the special areas of budget-making, planning, and attitudes toward the town's growth.

In general, the councils can be described as "reactive". The problems coming to them are in response to fairly obvious felt needs or are mandated by some change in legislation at a higher level of authority. Over one-third of the officials felt that the majority of council action came in response to mandated State and Federal regulations. That part of council activity that stems from local citizen demands begins as complaints from individuals or as proposals presented to the council by formal organizations—civic clubs, churches, or fraternal orders. One councilman described the process by saying, "Improvements are initiated by regulations, corrections are initiated by citizens complaints." Nearly 80 percent of all citizen/council contacts are complaints, only 1.3 percent are suggestions and 19 percent are questions—usually retrospective and asking why the council had acted in a certain fashion. Two themes—dogs and streets—head the list of kinds of complaints most frequently heard by council members. Thirty-five mentioned dogs; 37 mentioned streets. No other category of complaint (including garbage, rates charged for public services, city employees, pollution, parks, and sewers) was mentioned more than 10 times.

All council members recognized that information was needed if they were to do an adequate job of responding to public needs. The task of gathering information, however, was not thought to be easy. Responses indicated that the council persons distrusted input from individuals and therefore, remained somewhat aloof from their constituents. None of the contracted officials had any well organized mechanism for gathering citizens' opinions or input regarding the decisions that had to be made to run the town.

Although town council members did not have regular methods for gathering information from constituents, they did depend heavily upon others for inputs into specific decisions. The most-used source of information was the Association of Washington Cities.[2] This source was used by 42 percent of all council persons. Professionals, technical employees, and consultants provided additional information, usually of a technical or legal nature, on specific problems.

Council deliberation on proposed public action is held in open meetings, although varying degrees of informal discussion between council members may have preceded the meeting. Again, citizen input during the meetings was minimal. Even though council members continually stressed public participation at meetings, average citizen attendance was estimated at 2.8 per meeting and, the feeling among council members was that citizens attend meetings only when they feel threatened and want to protect a zoning ordinance, a right, or a privilege. Very little benevolent curiosity, or "assisting" attendance was encountered.

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[2] The Association of Washington Cities is a voluntary association used by Washington towns and cities to gather information, provide technical advice, and perform lobbying functions in the State Legislature. The Association has a small staff, publishes a modest periodical, and presently serves all towns and cities in the state.

Influence during council deliberations can be traced to two primary sources: civic organizations and one or more dominant council members. Influence exerted by social or economic elites, while often mentioned as having been important in the past, was apparently losing its effectiveness. Special interest groups were thought to exert influence indirectly through mandates from higher jurisdictions. Dominance by a council member was characterized by experience in local affairs and generally was construed as constructive.

Rules for council voting on a public decision are simple: the majority rules and the mayor votes only to break tie. The conduct of voting, however, is less clear. Often, no formal vote is taken. Following all discussion, a consensus or other informal agreement is reached and the measure is considered to be passed or defeated.

The entire process seems strangely devoid of citizen involvement. Does it result in decisions consistent with the revealed or intimated demands of citizens? The question has no easy answer. Even though town councils absorb critical input from a variety of places and profess to respond to changing needs of their communities, 56 of the 70 respondents said they felt no pressure to change the existing mix of public services. Only 18 suggested that some change in mix would be desirable.

THE COUNCIL AND THE BUDGET

Preparing the annual budget is one major function performed by a town council in the State of Washington. The budget is required by State law and it gives the council an opportunity to inquire into how monies are spent and how the town is functioning. In most towns, a subcommittee of the council works with department heads to determine how expenditures will be made during the next budget period. There are no designated rules about the makeup of the subcommittee, but it seems to fall into the hands of a senior council member who is often aided by the town clerk, the mayor, and several department heads.

Even though the budget is an extremely important function of the council, it appeared to be taken quite casually by most respondents. Over 85 percent of all council members queried had participated in a budget-making or approving process.[3] Of these 64 persons, 22 said their first contact with the budget was receipt of a preliminary budget that had been prepared in a committee. Thirteen agreed that they had helped make the preliminary budget and 10 indicated that the entire council issued a "call" for departments to submit anticipated costs and revenues. These were then used to develop a budget. Regardless of how information was gathered or who came in first contact with the budget information, two-thirds of the dependents indicated that the city clerk took major responsibility for preparing the budget.

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[3] The remaining council members were newly elected and had not yet served during the budget-making period.

Budget revision—the process of fine-tuning the budget to make it fit needs and desires was an area of some concern. About half of the respondents gave answers that were "past oriented." They indicated that they tried to make this year's budget look like last year's, they based changes on intuition, or they based changes on the past performance of existing departments. Twenty-three percent based budget changes on anticipated expenditures or on the basis of comments they had heard from city employees and others. The unaccounted 25 percent did not respond to a question regarding the revision of the budget.

Many town council members feel that too many town expenditures are mandated from outside the city itself. State and Federal regulations—particularly in the fields of service quality and the environment—have made severe impositions on the capacity of a local council to make choices. Council members themselves estimated that approximately 80 percent of all their towns' expenditures were related to some kind of mandate. Moreover, 57 percent of the respondents indicated that the proportion of the budget used to satisfy mandates was increasing over time. The reason given for these increased proportions included inflation, demands of citizens, and a tightening of the regulations themselves.

The problem of mandated expenditures was approached from a second direction. The councilpersons were asked if *regulations* decreased the flexibility of the council. Ninety percent said yes and 69 percent went on to say the reduction inflexibility was bad. When asked why such regulations were bad, 30 councilpersons said the regulations were unrealistic for small towns, 10 suggested local people know local problems best, 5 declared regulations to be un-American, and 4 said the regulations were inefficient. Two respondents thought regulations were good and were needed to protect citizen welfare.

Mandates and regulations are often accompanied by the possibility of grants. Although grants are often biased in favor of towns larger than those in the study, 23 councilpersons said their small towns were actively pursuing grants, 16 indicated their towns did not want grants, and 33 evinced a passive attitude (grants would be accepted but not eagerly sought). These responses were examined to determine if all respondents within a single town gave consistent answers with respect to grants. After new members of the councils had been removed (in most cases, new members could not form an opinion regarding grants) the remaining members displayed remarkable consistency within towns. Those towns actively seeking grants showed great uniformity within their councils.

The entire discussion relating to budgets is bothersome. It leaves the impression that the whole budgeting system runs by inertia rather than by effort and that local decisionmaking entities would not change their behavior even in the absence of the much-disliked mandated regulations. Flexibility is desired, but there is no way of knowing how such flexibility would be used. The generation of a decision model for small groups is difficult in the absence of this kind of information.

THE ROLE OF PLANNING

The Nation's recent interest in planning has trickled down to the small towns. Over 80 percent of the council members agreed that their towns either had their own plans or were part of a larger plan—perhaps one instigated at the county or multicounty level. Most respondents knew some city planning was required by various State, and Federal agencies as a prerequisite for some kinds of funding, however, the extent of respondents' knowledge concerning content of plans was limited.

The respondents were somewhat inconsistent with respect to the anticipated effects of planning on the budget activity. Although most felt that mandated regulations reduced flexibility in the budgeting process, only half of the respondents viewed planning as having any influence on the budget. Similarly, respondents were skeptical of mandates but generally agreed that planning helped to improve decisionmaking. Lead time, establishing priorities, and problem recognition were the main positive influences attributed to the planning process.

DISCUSSION

This is a preliminary report. Data came from 74 council members residing in 19 small communities in the State of Washington. The research was designed to ascertain how town councils decide; what makes them do the things they do; what factors influence the decisionmaking of individuals serving in elective offices. Simple counts and cross tabulations are revealing and show in general that town councils seem to operate on past experience and on the advice of technical experts or persons who hold technical positions in the towns themselves. The public decisionmakers do not appear to take great pains in searching for what is best for the community. They respond to problems and to mandates. If their own estimates are correct, they have little flexibility in choosing how town revenues are to be spent and their non-monetary choices appear limited to those that mitigate against nuisances.

A large body of economic theory has been evolving in an attempt to deal with the problems faced by public decisionmaking groups similar to town councils. This body of theory stretches along a continuum from centrism to polycentrism. Under a centrist regime, decisions are in the hands of technical experts who use technical data and requirements to make rules about water quality, dog control, and the necessary number of fire trucks. Under polycentrism, comparable jurisdictional units are allowed to exist side by side. Each of the many units perceives its own problems and finds its own responses. Centrism is technically efficient; polycentrism is "democratically correct" and is thought to be highly responsive.

In general, this nation moved toward centrism until about 1920. Since then, the mood of the public has been anti-centrist and has favored decentralization of public activity. The respondents in the Washington State study showed a perplexing combination of adherence to both styles of government. They wanted fewer regulations because regulations imposed unwanted limits on their spending behavior. At the same time they recognized that planning—even if imposed from above—was desirable and that the regulations stemming from the planning activity improved the quality of some services.

This research has not yet yielded a decision model nor has it either confirmed or refuted any of the popular notions about how groups decide. In order to do this, much more time will have to be spent with town councils and their members. The method for researching such problems is unclear. At this time, inductive logic seems to have more appeal than deductive. The "let's see how it works" approach of the institutionalists seems to be more appropriate than the normative prescriptions of the production-efficiency-welfare school of economic analysis.

Two approaches to the question of a choice model may be tried. The first calls for a large, cross sectional analysis of many towns engaged in the same decision struggle. Fifty towns, each agonizing over the purchase of a new piece of fire fighting equipment, may be the appropriate focus. In such a study, the questions should be geared to learning how information is gathered, filtered, dispensed, and acted upon. This kind of study would be manageable but expensive because the 50 towns might be widely separated and individual council members would be hard to reach.

A second approach involves close monitoring of one or two councils over a very long (5-years) time span. Under this scheme, the researcher could indeed learn the kinds of things that go into public decisions. The problem is one of transference; how much of what goes on in a Washington community would be of value in a West Virginia community? Until comparable case studies are examined, no one knows for sure.

Regardless of approach, one thing seems clear: economists must learn more about the process of group choice. At State and Federal levels, huge bureaucracies exist to maintain a specific set of ratios among kinds of expenditures. At county and local levels, there are habits and inertial forces keeping expenditures in line. But as councils and commissions change, the logic of group choice may become a more important aspect of small group behavior. The economist researching this theme may be able to add to the conventional choice models used in microanalysis or in examining different forms of market organization. This, however, seems unlikely. Success will more likely come after scores of towns and other small groups have been studied and a few essential threads of thought have been picked out for close examination. The present study may be regarded as a step in that direction.

MONTANA VOTER REVIEW OF LOCAL GOVERNMENT: IMPLICATIONS FOR POLICY AND RESEARCH

[By Lauren S. McKinsey and Peter H. Koehn*]

In design, the Montana voter review process is the most ambitious and comprehensive approach to local government reorganization yet attempted in the United States. All four main methods of improving local service delivery capabilities were embodied in the package conceived in the 1972 constitutional convention and implemented by the State legislature. Montana study commissioners were empowered to submit to local voters proposals that called for (1) restructuring governmental form to enhance efficiency or accountability (as in the replacement of a commission system with a manager plan), (2) reallocation of functions between local jurisdictions (as in total or partial consolidation), (3) revision of the balance of power between State government and local entities (as in the provision of home rule), and/or (4) reassignment of revenue-raising capacity consistent with the transfer of functions and powers.

The emphasis placed upon different approaches within these four categories reflects a State's philosophical approach to the rationalization of local government. Montana's method was unique since it promoted all four reform elements virtually simultaneously with respect to all city, town, and county government units. The 1972 Montana Constitution laid the groundwork for change by enabling counties to exercise legislative powers and any community to acquire self-government powers, to choose a new structural form, or to write a charter. A special provision, the voter review section, required the selection of local study commissioners for the purpose of exercising these options. Citizen commissioners were to study the existing form and frame a choice between existing and alternative arrangements for subsequent voter decision. Study commissioners could cooperate in presenting joint solutions such as consolidation, confederation, and service transfer. No community was required to change its form of government but each was provided a multitude of structural options from which to select a ballot alternative. In theory, any community could choose both the kind and extent of reorganization most appropriate to its unique needs for increased or improved representation, accountability, efficiency, planning, or service delivery. Thus, Montana's voter review provision was inflexible in the respect that it forced the process upon all local units, but extremely flexible if measured by the wide range of options, including the existing form of government, made available to each locality.

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Montana policy makers assigned the major roles in all phases of the review process to citizens. Voters elected their neighbors to study commission posts. Local residents were given wide opportunity to testify during the process leading up to the selection of an alternative form of government by the study commission.

Ultimately, voters decided at the polls whether to adopt the proposed alternative or keep the existing form of local government. The framers of voter review did not intend for the process to be measured solely by the success ratio of proposed alternatives. A vote to retain the existing governmental form could reflect broadened citizen awareness as an end in itself, or be considered as the first step in an incremental process of achieving change at some later date. This philosophy is reflected in the constitutional stipulation for subsequent local government reviews at 10-year intervals.

VOTER REVIEW IN MONTANA'S SMALLER COMMUNITIES

The main purpose of this paper is to present a preliminary assessment of the success of voter review in terms of improving the service delivery capabilities of Montana's smaller, more rural local government units. The assessment is based upon analysis of local government reform proposals and referenda results. All but three of Montana's 56 counties and all but two of its 126 cities and towns would be included under the broad definition of nonmetropolitan areas as places where fewer than 50,000 persons reside. The alternative threshold of 10,000 persons suggested for this Conference is also not well-suited to Montana's demographic profile. Instead, thresholds of 1,000 and 18,000 persons for cities and towns and 8,000 and 30,000 inhabitants for counties are used in this paper because they conform to significant breaks in the distribution of the state's 1970 population. This breakdown creates three categories which contain large, medium-size, and small local jurisdictions. Table 1 summarizes the distribution of Montana's local government jurisdictions according to the population categories we will use to explore the differential impact of voter review.

TABLE 1.—DISTRIBUTION OF MONTANA CITIES, TOWNS, AND COUNTIES BY POPULATION CATEGORY (1970)

Population category	Cities and towns	Counties
Small (100):		
0 to 1,000	68	
0 to 8,000		32
Medium size (69):		
1,000 to 18,000	52	
8,001 to 30,000		17
Large (13):		
18,001 and over	6	
30,000 and over		7

Table 1 dramatizes the critical problems of service delivery facing Montana's local governments. The State contains numerous concentrations of small population, separated by significant spaces. More than half of the cities and towns have fewer than 1,000 residents and over half of the State's counties are inhabited by fewer than 8,000 persons. The vast majority of communities do not have a population base capable of supporting anything but the most minimal services. Since most counties contain numerous small towns dispersed in low density patterns, they face severe problems of transportation in the delivery of county-wide services. By accepted definitions of economies of scale, there are simply too many local governments and too few people in each unit. And, Montana's problems do not easily lend themselves to simple territorial or governmental solutions because consolidations do not alter low density patterns.

While the large majority of Montana's local governments fall in the small and medium-size categories, most of the populace does not live in these units. More than one-fourth of the State's population lives in the six city settings of 18,001 persons or more and about 60 percent resides in the seven counties containing 30,001 or more. Many of these areas already are experiencing the typical problems of urban sprawl associated with inadequate planning and insufficient core city financing. Thus, voter review had to be designed with the problems of widely different kinds of communities in mind. While certain voter review provisions clearly reflect rural concerns, the expectations for reform in rural settings were lower than those for urban areas. This assessment is based upon Montana's limited pre-1972 experience with reform in several urban settings and upon a general awareness of Montana's small town and rural county traditionalism which fits the models developed in the literature. We fully expected status-quo interests to dominate the voter review process in small and medium-size communities and the profile of local governments in these areas to undergo little change. It seemed likely that these study commissions would propose less drastic alternatives and voters would be less inclined to approve the changes proposed.

We expected smaller communities to conduct a less intensive, more perfunctory voter review process. Our initial analysis of process variables confirms this expectation. In general, we found in small and medium-size communities a greater tendency to minimize the study phase, to de-emphasize public involvement, to miss procedural deadlines, to produce poorly drafted final reports and to abjure public education efforts following submission of final reports. An excellent illustration of the differences among communities based on size involves the selection and composition of the study commissions.

The legislature provided that study commissioners in all communities would be elected on a non-partisan basis, rather than appointed by local governing bodies. Mayors and county commissioners assumed responsibility for filling only those seats that remained vacant after the 1974 election. In the seven large counties, 145 candidates filed valid certificates of nomination for a total of 43 study commission seats. In 77 percent of the remaining counties, all or a majority of the seats were uncontested. A similar pattern holds for cities and towns. There were 88 official candidates for 34 seats in the six large cities while the number of candidates that filed in nearly every small town did not exceed the number of available study commission positions.

This lack of competition for study commission seats reflected an absence of indigenous reform interest in the smaller communities. Many vacancies remained unfilled for months, and several never were filled. Local officials showed relatively little concern about the vacancies and citizen pressure to fill them was absent. In some cases, only a veiled suggestion of illegality from State officials prompted local authorities to discover persons willing to serve. Most significantly, results of a survey of Montana study commissioners revealed that those from small and medium-size settings tended to be much more favorably disposed towards the existing forms of local government than their large community counterparts (see table 2).

TABLE 2.—ATTITUDES OF STUDY COMMISSIONERS FROM CITIES AND COUNTIES OF DIFFERENT POPULATION SIZE TOWARD THEIR EXISTING FORM OF LOCAL GOVERNMENT

[Percentage distribution]

Jurisdiction	Attitude					
	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Total
Small size city	2.4	11.0	18.3	56.7	11.6	100.0
Small size county	1.1	11.5	27.6	47.1	12.6	100.0
Medium size city	3.1	18.6	27.9	45.7	4.7	100.0
Medium size county	0	25.0	27.3	38.6	9.1	100.0
Large size city	12.9	29.0	12.9	35.5	9.7	100.0
Large size county	19.4	27.8	25.0	22.2	5.6	100.0

Source: Profile of Montana Local Government Study Commissioners, Peter Koehn and James J. Lopach, Occasional Series, Bureau of Government Research, University of Montana, September 1976, p. 17.

The same survey also discovered a marked tendency for the study commissioners from the smaller jurisdictions to assume a delegate rather than a trustee role in their deliberations. Thus, these study commissioners tended to rely on prevailing community preferences in support of the status quo rather than on their own judgment to propose possible improvements. Such differences in the makeup and attitudes of study commissioners confirm our initial expectations about the differential nature of voter review associated with community size.

Study Commission Proposals

As noted, we expected the more perfunctory approach to the voter review process in the smaller communities to culminate in a decision to offer the voters only the smallest of changes. Legislative implementation of voter review created almost limitless opportunities for reorganization. Massive change could be proposed, or study commissions could comply with the mandate merely by offering a switch from district to at-large elections, overlapping to concurrent terms or by adding a single commissioner or councilor. The legislature did not deny small towns and rural counties any of the options open to larger communities. In fact, town meeting, disincorporation, and county-county consolidation were offered with smaller communities primarily in mind. All available options are listed below, according to the degree of change from the existing form. For the purpose of this paper, major changes are subdivided into jurisdictional changes and structural changes.

AVAILABLE OPTIONS FOR CHANGING MONTANA LOCAL GOVERNMENTS

Major jurisdictional: County-county consolidation; Disincorporation; City-county consolidation; City-county confederation; and Service transfer or consolidation.

Major structural: New alternative form; Self-government powers; Charter; and Combination(s) of 1–3.

Minor structural: Size of legislative body; Administrative assistant; Partisan/non-partisan elections; District/at-large elections; and Other, or combination(s) of 1–4.

Prior to voter review, the profile of town and city government in Montana showed 123 mayor (generally weak)-council forms, with three manager forms of government in large cities. Only one small county with a manager deviated from the commission form of government. Home rule and charter-writing had not been allowed. No city-county consolidation plan or disincorporation proposal had been approved by Montana voters. Several dozen cities and counties had experimented with service consolidations, principally in the areas of law enforcement planning, and library services. Table 3 summarizes the changes in this profile that were proposed by the study commissions and shows that 122 study commissions (65 percent of the total) submitted proposals calling for major changes in *local government.*

TABLE 3—SUMMARY OF STUDY COMMISSION ALTERNATIVE FORM PROPOSALS[1]

	Community category						
	Large		Medium size		Small		
Available options	City	County	City	County	City	County	Option totals
Major jurisdictional	2	2	7	2	2	3	18
Major structural	4	4	34	11	28	23	104
Minor structural	0	1	14	4	38	10	67
Community totals	6	7	55	17	68	36	189

[1] Table 3 utilizes the population categories of table 1 and the available options categories.

We hypothesized that fundamental change would be proposed more often by study commissioners in the more populous settings. Proposals for major jurisdictional change were offered by 18 study commissions. City-county consolidation proposals emerged from study groups in one medium-size and two large localities. Study commissioners in two medium-size and two small towns submitted disincorporation proposals. Service transfers were proposed for one medium-size and three small counties. Thus, although only a small number of study commissions presented major jurisdictional changes, the proportion of jurisdictional proposals to all proposals was much higher in large cities and counties than in medium-size and small settings. Thirty-one percent of the alternative proposals submitted by study commissions in large cities and counties dealt with jurisdictional change, compared to 13 percent and 5 percent in medium-size and small localities. These findings support our initial hypothesis regarding the nature of study commission proposals.

When we consider only structural changes, the directionality of the data regarding the nature of proposals also supports the hypothesis. In large jurisdictions, 89 percent of the proposals submitted involved major rather than minor structural change. In medium-size localities, 71 percent of the proposals called for major structural change; and, in small communities, the figure was 52 percent. However, 70 percent of the study commissions in small *counties* presented proposals for major structural change. Only in small *towns* did a majority of the structural proposals call for minor change (see table 3).

VOTER REACTION

While it is clear that degree of change proposed is related directly to community size, the same cannot be said for the rate of voter approval of proposals. Simply because an active study commission in a larger setting proposed a radical change was no guarantee that the voters would endorse it.

Depending on the role orientation of the study commission, the proposal offered may have exceeded the public's tolerance for change even in the largest urban areas. In fact, it is reasonable to expect a greater rate of voter approval in the smaller settings precisely because the lesser amount of change proposed was palatable. The data do not confirm this expectation either, however (see table 4).

TABLE 4—SUMMARY OF VOTER APPROVALS, BY NUMBER AND PERCENT OF PLANS PROPOSED

[Figures in parentheses are percent]

	Community category					
	Large		Medium size		Small	
Available options	City	County	City	County	City	County
Major jurisdictional	1(50)	1(50) [1] 1	4(57)	2(100) [1] 2	0 (0)	2(67) [1] 3
Major structural	2(50)	[1] 4	3 (9)	[1] 5	10(36)	1 (4) [1] 6
Minor structural		[1] 7	1 (7)	1 (25) [1] 8	9 (24)	0 (0) [1] 9

[1] All numbers.

A closer look at the data in certain of the cells in table 4 may provide better understanding of the factors at work in the process of voter approval. There is reason to conclude that a combination of community need and active study commission facilitated success in a few urban areas. Voters ratified two of three city-county consolidation proposals by an average margin of nearly 60 percent and the third proposal was only narrowly defeated. Also, Montana's largest city approved a manager plan to join three other manager cities in the large city group. Only one city in this category remains "unreformed." Significantly, reform proved more difficult to achieve in the remaining large counties, where rural voters defeated all four proposals for major structural change (three county managers and one county executive) by an average margin of about 58 percent.

Major jurisdictional change fared less well in small towns. Voters rejected the four city and town disincorporation proposals by an average margin of nearly 80 percent. Despite the fact that disincorporation has virtually the same effect as city-county consolidation, voters in these cases apparently viewed this approach as far too drastic in terms of loss of local identity. In contrast, voters approved three out of four individual law enforcement transfers between city and county, in one case by a margin of two-to-one. Since an individual service transfer clearly constitutes, at most, a partial disincorporation or consolidation, it can be considered the least radical of the jurisdictional changes available in Montana. Smaller communities, therefore, demonstrated a willingness to approve only less drastic jurisdictional changes.

Significant patterns emerge from data found in the remaining cells of table 4 only when we separate counties from cities and towns. Reform of county structures simply failed to occur. County voters approved only 1 of 38 major structural change proposals and only 1 of 15 minor ones. A typical rural county charter defeat was by a margin of more than two to-one. Clearly, status-quo oriented rural county voters had an extremely significant impact on referenda results in small and medium-size as well as large Montana jurisdictions.

In strictly quantitative terms, the largest number of "reforms" occurred in small towns. In medium-size towns, voters tended to reject minor (93 percent disapproval rate) and major (91 percent disapproval rate) structural change proposals (see table 4, cells 8, 5). Only one medium-sized town adopted a form that differs from the mayor-council model. In contrast, the approval rates for small towns were 36 percent and 24 percent (see table 4, cells 6 and 9). Most significant, the success rate for major structural change in the small town category (36 percent) was considerably higher than the approval rate (24 percent) for minor structural change.

Although the approval rate was relatively high for small towns proposing major structural change, it is also true that certain more radical proposals in this category fared poorly at the hands of the voters. The town meeting form was offered as the alternative in eight places and was decisively defeated seven times by an average margin of 71 percent. The 10 instances of successful major structural change for small towns included only three deviations from the mayor-council model. Adoption of self-government powers comprised the central ingredient in five other successful small town proposals.

Nonetheless, these changes were significant and the rate of adoption in small towns was surprisingly high. We are led to conclude that this outcome is related to process variables which have not yet been examined closely. For example, an active study commission in a small community may have been better able to sell reform on a person-to-person basis than its counterpart in a medium-size community where interpersonal contact is more difficult. These results point to the need for more extensive research that will enable us to comprehend the complex effect of community size upon voter approval.

SUMMARY AND CONCLUSIONS

Montana's voter review record provides no basis for upward revision of the national average of successful local government reform efforts. Voters approved alternative proposals in 33 instances, resulting in an approximate approval ratio of only one-in-six. About one-fourth of these reforms at the ballot box occurred in the small town/minor change category, where eight of the nine modifications involved merely a switch to at-large and/or non-partisan elections offered as the least change to satisfy the voter review mandate. Some of these communities merely utilized a fill-in-the-black report supplied by the State Commission on Local Government for the purpose of facilitating compliance. If we assume that a fair index of reform is the voter approval rate times the degree of change, the outcome in these smaller communities is relatively unimpressive.

This conclusion leads us into an evaluation of a Montana-style voter review process for nonmetropolitan settings. First, the universal voter review mandate may be ill-suited to States with a large number of small communities where strong traditionalism evokes basic satisfaction with existing structures or where service delivery expectations are low. Instead, the resources required for a broad voter review effort could be concentrated in jurisdictions that demonstrate some level of indigenous interest in change. State funds might also be applied in model settings to help set precedents for neighboring communities. And, the Montana small town results provide some basis for concluding that limited functional service transfers and consolidations should be subsidized at the expense of more formal and total jurisdictional consolidations.

Second, a State should consider seriously the sequence of reform involving the four categories introduced at this paper's outset. Should structural reform precede provision of self-government powers? Should rational local government jurisdictions be emphasized ahead of cosmetic structural reform? Should increased financial capability be offered as an incentive to structural or territorial reform? The Montana approach packaged the entire gamut of reform options with little attention devoted to the interconnection of elements. As a result, voter review was confusing, even staggering, to many people who attempted to understand it. The ultimate assessment may well be: too much, too fast—especially for non-metropolitan areas.

Finally, the outcome of Montana's voter review process adds a somewhat curious dimension to the dialogue over public choice theory. A major premise of voter review held that, in the absence of formal and periodic mechanisms for registering choice, there is a strong presumption that existing arrangements do not actually reflect citizen preferences. Many initial proponents felt that inertia had precluded local government reform and they believed that local citizens would respond favorably to an opportunity for change. Meritless, traditional defenses for archaic structures would be exposed and overcome according to this view. Voter review conformed to this model in some localities, including a few nonmetropolitan settings. While this record is significant, the lack of reform in the majority of nonmetropolitan settings seems to confirm the opposite presumption: lack of indigenous political ferment usually implies satisfaction with existing arrangements. According to this modified public choice perspective, then, most Montana citizens have affirmed their commitment to traditional methods of local service delivery.

SPECIAL DISTRICTS IN NONMETROPOLITAN AREAS: SOME POLICY AND RESEARCH ISSUES

[By Robert B. Hawkins, Jr.*]

"Local government districts, as experience across the country shows, are often associated with competition for financial resources, weaken general purpose units of local government and impair popular control of government" (4, p. 1). If one uses this assertion to interpret the fact that approximately two thirds of all districts are located in nonmetropolitan areas, one is lead to the conclusion that rural political and governmental institutions will likely be inefficient and unresponsive. That the opening assertion is underpined by assumptions of the reform theory of local government need not be questioned. What does need to be questioned is the adequacy of such conceptualizations in furthering our understanding of district government and the warrantability of derived hypotheses. This paper briefly outlines the dominant theoretical system that has guided our understanding of districts and public policy towards districts. We then review existing evidence concluding that new conceptualizations are needed if we are to further our understanding of the capabilities and limitations of district government. The final section deals with promising areas of research about districts. Before turning to these issues, a description of district governments will provide a general background for the ensuing discussions.

WHAT ARE DISTRICTS?

Districts make up the most numerous unit of local government, totalling 23,885. They are also the growth sector of the local government industry; growing between 1962 and 1972 at a rate of over 30 percent.

The most common characteristic of districts is that they generally provide only a single service. The range of services provided by special districts parallels those provided by other units of local government. From services such as water, sewage, and fire protection to recreation and planning, they are used to deliver these services to diverse communities of interest. Over 65 percent of all districts provide their services to nonmetropolitan communities, making them an important sector of the local government economy in rural areas.

Legally, there are two general types of districts. Dependendent districts are creatures of cities or counties. They are formed and controlled by these units of government to provide residents of these communities with higher levels of service than are normally provided.

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They are also used as institutions to finance such capital improvements as sidewalks, street lighting, and sewage collection. Independent districts, the second type, enjoy many of the same powers as cities and counties. State authorizations provide the necessary authority to allow citizens to form, control, and dissolve these units of government. They are generally controlled by elected boards, have the right to tax and to determine their own administrative structure.

In rural areas, except for irrigation, districts have relatively small budgets and serve relatively small-homogenous populations. Evidence from California suggests that the fiscal structure of districts are significantly different from cities and counties. Fifty-four percent of the revenues collected by districts are in the form of user fees: significantly higher than cities (at 33 percent) or counties (at 9 percent). This difference is a function of the types of goods they produce, the problems they attempt to solve and the preferences of communities they serve (2, pp. 7–27).

ISSUES

Because relatively little systematic evidence has existed on the performance of districts, most of our understanding has been a function of different normative and theoretical models of politics and organization. Given this state of affairs, it is not surprising that there is no coherent set of public policies regarding the use of districts to provide public goods and services. In fact, what one finds is a schism between theory and practice. Advocates of the conventional wisdom, such as the Advisory Commission on Intergovernmental Relations and the Committee for Economic Development, contend that because special districts fragment authority and responsibility, they create inefficient and unresponsive government. Their recommendations include consolidation, restricting district authority and the creation of a boundary commission to regulate their formation and activities. Despite 20 years of study and efforts to curb their use, districts are the growth sector of the local government industry. Evidently elected officials and citizens still find utility in their use. This disparity between conventional wisdom and actual practice leads one to question conventional notions about the performance of districts. It is to these questions that we turn our attention.

DISTRICTS AND PERFORMANCE

The theory that underlies most local government reform efforts has the organization as its basic unit of analysis. It presumes that politics and administration are separable. It also assumes that once an optimal organizational structure is developed, political interests will also be maximized. The optimal organizational structure should have sufficient size: (1) to realize potential economies of scale, (2) to realize effective government action in such areas as planning and program coordinating, (3) to internalize all significant aspects of public problems, and (4) to realize adequate management and operational capacity.

Efficiency

One of the key claims made against districts is that because of their size they cannot realize decreasing unit costs or effective operations.

These claims have been more a function of theory until recently, because evidence on district performance did not exist. Several studies have recently been conducted that begin to provide evidence on this question. The California Local Government Reform Task Force compared the operating costs per gallon of effluent to the total annual volume of sewage treated by 153 cities and districts. Using data from the California Water Resources Control Board on quality of treatment, the study found significant unit cost reductions as the size of the treatment operation increased. When the performance of cities and districts were compared, no significant difference could be found, even though the data underestimated the actual expenditures for cities. A study of 81 city and district fire departments could find no strong statistical evidence to warrant the conclusion that city provision was necessarily more efficient.

A study of school districts found that size was directly related to performance and efficiency. Using performance on standardized tests at the sixth and twelfth grades, holding income and race constant, the study found that unit costs increased while learning curves dropped as school systems increased in size above approximately 2,500 students. This finding was consistent with other studies that "have found either no relationship or a negative one between student enrollments and the level of educational output" (2, pp. 28–46).

Although these studies do not provide an adequate base upon which to draw absolute conclusions about district efficiency, they strongly suggest that districts, when operating in similar circumstances, will manifest the same strengths and weaknesses as other units of local government. And it is precisely when circumstances are dissimilar that districts find one of their strongest justifications for providing public goods and services.

Intergovernmental Cooperation and Problem Solving

Although the Advisory Commission on Intergovernmental Relations contends that ". . . small units of local government lack appropriate incentives to cooperate," there is very little evidence to judge such assertions. However, given existing evidence on joint ventures between units of local government, one would assume that there are incentives for intergovernmental cooperations where all parties stand to gain. At the regional level, special districts have been one of the primary mechanisms used to solve problems that transcend the jurisdictional boundaries of counties and cities. From the creation of the Metropolitan Water District of Southern California, to multi-county districts to carry out planning and provide numerous public services, one finds a rich array of organizations that are the direct result of cooperative intergovernmental relations. A recent study in California found that, in the case of fire and water districts, there appeared to be systematic patterns of cooperation. Interties between water districts—an important activity of system maintenance in cases of emergency—were found to increase as districts increased in size and served areas that were more urbanized. Likewise, it was found that fire districts were more likely to respond to mutual aid assistance as they served more urbanized areas (2, pp. 71–87). This evidence suggests that there are incentives for intergovernmental cooperation and that the key policy and research problems center on questions of what is *appropriate* cooperation and to what degree such cooperation can deal with externality problems.

Responsiveness

Because of their multiplicity and their low voter turnout, it is assumed that districts are less accountable than other units of government. Yet, logically there is no necessary relationship between multiplicity, low voter turnout, and responsiveness. Because there is little direct evidence on citizen satisfaction with district government, one must attempt to answer such questions inferentially. An explanation of district responsiveness based solely on low voter turnout is tenous at best. Voting is only one of many ways in which districts can be and are controlled. Other factors of control included interest groups' pressure, homogeneity of community values, competition with other units of local government, and State constraints on district activities. For several reasons, one is led to conclude that districts can be as responsive as other units of government. A consistent finding of major surveys of citizen satisfactions indicates that citizens most likely to be served by districts also have higher levels of satisfaction with services. Also the consistent and strong demand for district government suggests performance capabilities attractive to citizens and elected officials. Finally, as this paper will suggest, the logic inherent in district government increases the probabilities that they will perform responsibly.

DISTRICTS FROM A DIFFERENT PERSPECTIVE

From the perspective of the reform theory, districts are, by definition, irrational forms of organization. Yet hypotheses derived from this theory find little empirical support. It is impossible to understand district government using these assumptions, so we turn our attention to the application of economic reasoning with its emphasis on the individual and the nature of public goods and services.

The individual, rather than the organization, is the basic unit of analysis. Interest and choice are the key determinants of organizational structure. The assumption of individual rationality, with its ranking of prepreferences, allows one to view the role of political institutions as one of preference aggregation for problems requiring public action. It is this initial shift from the organizations to the individual as the basic unit of analysis that makes public choice a more potent explanatory theory of special districts. For, as Ostrom has pointed out, the logic of political action inherent in the U.S. Constitution is based upon the building of political institutions upon constituencies of individuals (6, pp. 17–20). Thus, the logic of collective action is inherently individualistic and special districts are one possible organizational response to communities of interest in the process of institution building.

Because citizens have diverse preferences, the boundaries of problems vary, externalities differ by function, and circumstances vary, one would expect that a variety of organizations would be necessary to achieve optimal service delivery and problem resolution. Potential variety is further increased when one notes that there is no necessity in having both the demand and supply functions within one organization. (In fact economic efficiency may be enhanced through their separation.) Variety of organizational arrangement is also increased by a Federal system that encourages the creation of self-governing institutions. In realizing these opportunities for self-government, citizens find that organizations have limitations as well as capabilities. Some of these limitations are found in the nature of public good and services, including the existence of public goods, common resource problems, and externalities. Other limitations are the boundaries of problems, the boundaries of communities of interest, and the capital requirements of a project. For example, the creation of the Metropolitan Water District of Southern California is an excellent example of where the boundaries of a problem and the capital requirements for the project exceeded the capacity any one of the existing local governments. Likewise, there are internal constraints in service delivery in large governal purpose units of government that create demand for district organization: scarce resources and competitive demands make it extremely difficult for such units to respond effectively to small communities of interest with high or low demands for services.

While there may be economic gains through integration of service delivery in cities and counties, it is also clear that these same organizations have limitations. It is precisely at the point where these limitations are reached and demand continues for services that calls for some form of district organization. For example, parts of two counties, including five small cities, comprise the boundaries of a mosquito vector. Although each entity can undertake appropriate provisions of the good, experience suggests that a public good problem occurs, with a district form of organization being an appropriate way to resolve the problem.

Districts can be defined as units of government that derive their decisionmaking capabilities from State legislation and are used at the local and regional levels by communities to solve problems of common concern. They are particularly appropriate institutions to serve communities with intense preferences for goods and services and to solve problems of boundary, externality, and common resources.

Before turning to the question of research and public policy, a few comments on the application of public choice to rural areas are in order. Although theorists and researchers have applied public choice theory to urban areas, it is argued here that it is just as applicable in rural areas.

The mere existence of districts suggests that there are numerous and distinct communities of interest within rural areas. Their existence also suggests that there are diverse production arrangements for the provision of goods and services. A recent study by the California Department of Forestry to determine whether it could combine provision of structural protection with its wildland responsibilities concluded that the costs would not only be higher but also that—

> . . . there is no single answer to fire protection needs in all rural wildland areas of California since these communities are in different stages of development and therefore require different levels of sophistication of fire protection (1, see abstract).

PUBLIC POLICY RESEARCH AND DISTRICTS

One of the key problems faced in designing responsive political institutions is how to provide small, relatively isolated rural communities with adequate political authority and adequate fiscal resources to provide services that are responsive to their needs. To merely consolidate such units into large units increases the likelihood that political control and hence control of service delivery will be weakened. Also the failure of consolidation at the polls guarantees that districts will continue to be an important sector of the local government industry. Given their continued use and the lack of specific information on many aspects of their performance capabilities and limitations, a number of important policy issues need to be researched. However, before turning to these ideas it is important to isolate the key normative assumptions that orient research.

Although the distinction between "is" and "ought" is increasingly blurred in the arena of public policy research, it is still a real and an important one. A common notion is that the design of self-governing institutions is a technological one: by knowing the parameters of efficiency one can design responsive self government. While a number of positive arguments can be made for a strong and diverse set of local government institutions, ultimately the justification comes down to a bias in favor of federalism or local self government. This bias has become an article of faith in American political culture and is one that I share. The burden of choosing responsive local government institutions, according to Alexander Hamilton in *The Federalist Papers*, is one of the inescapable responsibilities of citizenship. Yet even Hamilton mused whether such choices would be based on reflection and choice or on accident and force. The role of public policy analysis in this tradition is to outline the presuppositions of local self governance and then to provide citizens and policy makers with information that will inform their decisions regarding the performance capabilities of local government.

In rejecting traditional criteria of organizational rationality, new criteria are needed. Vincent Ostrom has outlined four requisite elements for what he terms the constitution of self-governing enterprises:

1. A public good that is shared and of sufficient magnitude to create interdependence among a large number of users produces the necessary interest for the creation of a public enterprise.
2. A bureaucracy is immediately accountable to the relevant community of interest for which it is acting.
3. The costs of providing a joint-good are funded by the constituents in proportion to their benefit.
4. Public facilities are subject to use under terms and conditions that are considered by the relevant community to be reasonably designed to meet their common welfare (5, pp. 20–29). These initial criteria provide a base from which one can judge the appropriateness of self-governing institutions at the local level.

RESEARCH AND POLICY ISSUES

There are two key sets of policy issues related to questions of structure and organization. The first set centers on constitutional considerations of organization: the rules of the game that determine how organizations will be formed and the terms and conditions under which they will operate. The second set concerns what effect different structural factors have on performance.

In order to study the effects of structure, as different rules of the game, a new definition of organization is necessary. The Weberian conception, underpinning reform theory, with its assumption of optimal organization as one that can monopolize coercive force and authority, is too restrictive. For the assumption we are attempting to test is whether alternative organizational arrangements do in fact effect outcomes. Thus, the economic definition of an organization as a "bundle" of decisionmaking rights is more attractive. This definition is not foreign to our political system, for the separation of powers doctrine provides that different organizations are given different bundles of decisionmaking rights. Such rights or liberties provide official and citizens with the capability or authority to undertake public actions, while at the same time imposing limitations in the form of duties and exposures. In the case of districts, authorizations to act as well as to alter and enforce legal relationships rest with State legislation. To understand their formation and their operation requires that we understand the effects of State authorizations upon district governance. It is here that one finds the terms and conditions that set the initial boundaries of self governing enterprises, especially for districts. For these terms and conditions specify when significant interest exists, how it is to be aggregated and the general conditions for operation. Not only do we need to know in more detail how these rules operate to create successful enterprises, but we also need to know how the rules need to be changed to meet varying conditions.

There are also a number of specific and important policy issues involved in the legal relationships between districts, the Federal Government, and the States. A prerequisite of local self government is adequate freedom to undertake activities that realize local purpose. When such liberty is lacking, it is an error to talk about self government. In such cases, local governments become mere administrative arms of the State, similar to the French prefectorial system. Analytically, one can view Federal and State intervention into local affairs as action that constrains the decisionmaking rights of local organizations. Substantively, the issue of intervention centers on the question of when local institutions cease to be effective political organizations. It is clear that we need more systematic evidence on the effects of State and Federal intervention. We need to know what effects such intervention has on self governance, whether Federal and State justifications for intervention are justified, whether programatic expections are realized, and the nature of the trade offs between externality-equity concerns and self governance.

Intergovernmental Relations

State authorizations set the initial boundaries for intergovernmental behavior. They can facilitate or hinder cooperative behavior such as contracting, joint ventures, and the provision of services by one unit of government to another. Study is needed into the effects of State authorizations in this area. However, the most important research topic in this area is nothing more than good systematic empirical research into the intergovernmental behavior of districts. We need to know the number and types of such activities, their effects on increasing organizational capacity, their success in solving externality and planning problems, and activities between districts and other units of local government. Although existing evidence leads one to assume that conventional wisdom regarding the lack of cooperation between these units of government is misleading, we need to know the extent of these relationships if policymakers are to pursue rational policies.

Systematic study is also needed in State efforts to rationalize local government structure through boundary commissions. Wagner and Martin suggest that Local Agency Formation Commissions in California have increased the cost of government and also decreased the opportunities citizens have in designing responsive governing institutions (3). These findings suggest that competition between local governments may not have the deleterious effect predicted by reform theory. We need to know what effect a number of governmental agencies have on a specific local government economy. It may be that policymakers will only make matters worse by attempting to abridge the rights of citizens to form self governing enterprises. Finally, we need to know what impacts districts have on comprehensive planning at the local level. A common criticism of counties is that districts ignore or make it impossible to undertake comprehensive planning in such areas as land use. A key policy question concerns the costs and benefits of alternative ways of achieving comprehensive planning. The traditional approach is to give some organization the authority to undertake comprehensive planning activities. We need to know whether the game can be rigged in such a way as to allow local communities to pursue their own plans while internalizing certain constraints that allow system goals to be realized.

Organizational Structure

Districts, more than any other unit of government, allow us to test the presumption that different organizational structures produce different outcomes. This is so because of the wide variety in the State authorizations that communities can use to produce public goods and services. In California, there are over 180 district authorizations, and in many cases there are more than several authorizations for the same function. Because districts are relatively simple governmental organizations, when compared to general purpose units of government, they afford the researcher the opportunity of isolating the effects of changes in decisionmaking rights. There are a number of promising areas of research, such as: the effects of Federal and State policies, that constrain the rights of districts, on performance; and the effects that different rights structures have on the provision of the same service, pricing and fiscal decisions of governmental entities, and questions of equity. An example illustrates the importance of this type of research.

The author is presently interested in ascertaining what effect different voting rules have on the performance of irrigation districts. Proponents of land voting districts, formed and controlled through franchise based on assessed valuation, claim that such rules are necessary to create such enterprises and to run them efficiently. These claims have not only persuaded State legislators but also the courts. Opponents of this system claim that such a rule is not only unconstitutional but that there also is no necessary relationship between the rule and efficiency. In California, it appears that one can test these assertions. Not only can one test for comparative efficiency, but because these districts are relatively small, one can also test for effects in areas such as responsiveness, consumer control, and the responsiveness of management to elected officials.

Efficiency

The critical economic problem facing rural areas is generally providing services at least cost from a limited range of alternatives. Traditional economy of scale studies are of little value in most instances, because of the relatively small size of most rural communities. If public policy is to encourage public enterprises to seek the most efficient provision of goods and services, there is a pressing need for evidence on existing and potential production arrangements. Even though one finds a diverse set of production arrangements among districts in California (disposing the notion that there are no incentives for cooperative activity), there are still a number of outstanding economic questions.

Although public choice theory suggest that districts are a rational form of government when they apportion benefits through user fees or produce services for relatively small homogeneous populations, we need more empirical evidence on district efficiency. We need to know how effectively districts produce services that satisfy the preference of its consumers, especially in light of low voter turnout. Comparative studies are needed to ascertain when a dependent district is a more appropriate institutional response than an independent district. Theory would lead one to predict that dependent districts will meet demand effectively but that they will also be susceptible to the same production efficiencies and inefficiencies of the parent organization.

We also need to know what effect districts have on questions of equity and income redistribution, especially in light of the fact that districts rely on user fees more heavily than other units of government. However, if one allows larger units of government to deal with questions of equity, districts may be very rational forms of government to deliver services to low income and minority communities. The affinity between district government and the demands of minority groups for governmental units to tailor the provision of goods and services to their communities suggests that this area needs to be researched in greater detail. In California, for example, this research would be most appropriate for migrant farm populations that are in the process of attempting to settle and build communities.

CONCLUSIONS

Special districts are units of government created to overcome limitations in other governmental arrangements; they augment the capabilities of the existing system of local governments. Districts will never replace cities and counties as the primary producer of local services. Yet as long as we use these units of government, there will be a demand for district governance. Because the constitutions of self governing institutions are neither self creating nor self regulating, there is a constant need for public policy analysis to study the effects of structures on the delivery services at the local level. Districts are no exception. There is a constant need to study the effects of State authorizations on district behavior and to recommend changes when human welfare is not advanced.

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GRASS ROOTS CAPACITY BUILDING AND THE INTERGOVERNMENTAL SYSTEM

[By Leigh E. Grosenick*]

Recently, national level governmental management experts have become concerned with the abilities of the States and their local governments to respond to the tremendous management burdens which have "fallen in their laps" because of a shift of emphasis within the American intergovernmental system from less governmental activity by the State and local governments to more; and from more Federal interference in nationally supported activities to less (6, 8, 9). In summary form the argument can be stated rather simply.

Facts:

1. The country is faced with a different set of complex governmental management problems than it has ever encountered.
2. These problems take diverse forms in different parts of the country.
3. In response to these problems, the national (the Federal administrative structure) has responded through direct or indirect means.
4. The past four national administrations have "devolved" responsibility to the States and localities for solving these problems, while financing their solutions and contributing minimal general management assistance.
5. Although some States and local governments have made some "significant" progress in upgrading their management capacity, *most* have an extremely limited ability to plan and manage on a long term basis.

Therefore:

> Although the States and localities are primarily responsible, the tremendous influence of Federal assistance and policy direction dictates Federal monetary and skill assistance in helping the non-performing lower levels of government to develop those management and planning skills which will allow them to fulfill their "responsibilities" to the citizens (8, p. viii).

This observation, whether backed by volumes of data and systematic study or simply acquired through experience in managing at one of the three major governmental levels, has assumed conceptual status and is now translated as a need for capacity building at the State and local governmental levels.

To the average governmental official, whether appointed or elected, clerk or governor, capacity building has become the new Holy Grail or philosopher's stone of modern American governmental management. It raises the hopes of finding new ways of solving problems other than by throwing money at them through demonstrations, controlled administrative experiments, or continuing exhortation. It also assumes that the fractionated Federal administrative apparatus only occasionally "led" by the Executive Office, can somehow provide an administrative example and real assistance in helping to solve those capacity-building problems which the State and local governments have been accused of allowing to grow and overwhelm the nation.

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This essay addresses the practical aspects of any major attempt to engage in capacity building within the confines of a governmental system, which broadly conceived, consists of over 80,000 units of government, each with some discretion as to how the planning and administration of each will occur; and all with decision potentials that will affect at least one other jurisdiction and the citizens thereof. In a major sense, it is a plea for plain talk, not jargon-laden consultant reports or bureaucratic persiflage; a realization of the major environmental factors which influence the major management decisions to be made; and a continuation of support for those efforts of public officials, scholars, and citizens, aimed at improving the ability to supply the needs of citizens without infringing on their constitutional freedoms.

CAPACITY BUILDING

What is capacity building? Although many administrators, scholars, and even some politicans use the term, a precise definition is rare. Especially, insofar as a definition of the problem associated with the concept can be utilized as a starting point for constructive policy initiations. The Federal management report cited above approaches the definition from the effects of its absence.

> Most (States and local governments) have an extremely limited ability to plan and direct on a long-term basis for the total needs of their particular jurisdiction. The usual management style is the functional approach—presiding over a fractionalized set of programs with little attention to the whole. The jurisdictional approach—which requires integration of needs analysis, goal setting, long term planning and evaluation with daily operations—is beyond their existing management capacity (8).

Another definition is:

> * * * to strengthen the capability of Federal, State and or local government officials to manage their programs, to provide services to their constituents, or to manage their overall jurisdictional or interjurisdictional responsibilities (2, p. 706).

Still another analyst approaches the definition more obliquely by noting:

> * * * the processes we use in making policy and managing public affairs are basically the same as they were two decades ago, while the problems and challenges during the same period have grown enormously (11).

Other definitions may be found for this operationally elusive concept. The key element in any definition is the subject—management. As it is developed, management comes to encompass the total direction and application of policy as it pertains to any civil jurisdiction. By implication, planning and delivery of services, the staff activities necessary to deliver those services as encompassed by long range planning, the adaption of these policies to both the desires of the citizens (however interpreted) and the effects of these policies on other jurisdictions, are all important elements in defining capacity building. In simple terms, those who criticize State and local governments for their lack of effectiveness in serving the public are saying that these units of government cannot plan or manage, and that until they can, the public will not be served.

CAPACITY-BUILDING ENVIRONMENT

Basic to any consideration or evaluation of the causes and effects of the lack of management capability (and by projection, how such problems can be overcome) is an understanding and willingness to work within the constant, yet ever-changing environment of American government. Or, rejecting environmental realities emphasizing governmental organizational characteristics and spending excessive time and resources attempting to change the basic organizational conditions under which we now operate.

Unfortunately, in the search for a managerial utopia, the spokesmen for more effective policy implementation have too often equated organizational simplicity with effective management. The pleas of scholars and good government groups for consolidating and rationalizing the delivery of services through the creation of even larger jurisdictional bodies have continued for the past 75 years, with but one recent interruption of a decade when decentralization—a complete organizational about face—changed the focus from managerial rationality to citizen responsiveness. However, even this change seems a passing fad destined to take its place with proportional representation as a good idea but out of tune with both tradition and need. Regardless of which approach is pursued, the obvious lack of consideration of the major environmental constraints in developing a "perfect" capacity-building delivery system continues to thwart real progress toward arriving at managerial processes which are effective within a governmental tradition of shared policymaking responsibility and functional independence.

Broadly conceived, the major variables which dictate the manner in which capacity building can proceed are at present:

1. A continuation of the three-tiered system of Federal-State-local government each with overlapping responsibilities and a real need to coordinate and assist each other; *i.e.*, "picket-fence Federalism" (10).
2. A Federal grant-in-aid system which has developed some experience in directly intervening in State and local service delivery systems and is stimulating the State and localities to improve services;
3. A Federal grant-in-aid system which is still functionally oriented and only loosely held together for management purposes by an executive organization which can recommend, but not impose managerial uniformity;

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4. A willingness on the part of most State and local governments to engage in varying degrees of managerial reform, but unwilling to change the basic rules of governance to accommodate "rational" organizational solutions to pressing service delivery problems;
5. A continuing variety in the severity of State-local service delivery problems and availability of financial resources to alleviate these through local and inter-governmental efforts to assist;
6. An open managerial system in which functional expertize, political loyalty or simple availability dominates proven general management ability for management leadership positions, *i.e.* managerial Jacksonianism; and
7. A proclivity in the intergovernmental system to accept "heart and lung machine capacity building" as a solid base upon which a more permanent ability can be built.

Of course, the list could be exapnded and a great deal more attention paid to the relationship between financial resources and the severity of the problems that have been defined. These were chosen because in the scholarly search for solutions to governmental problems they are most frequently overlooked as elements to be reckoned with in any practical attempt to improve managerial effectiveness within the intergovernmental system.

Each of these elements could be the subject of a book but most are so widely accepted that little more than a listing of the general effect of each is required. Others have not been discussed within the context of management and capacity building and therefore need some further explanation.

Management and Governmental Policymaking

The three-tiered government element is often referred to in terms of the need for greater discretion on the part of States and local governments in utilizing Federal aids; for States to improve their revenue producing capabilities; or for improving the management capabilities of local government by authorizing home rule, lotteries, local sales taxes, etc. In addition, we often observe that this arrangement has resulted in a multitude of decisionmaking bodies whose responsibilities are more appropriate for a rural, rather than an urban nation. While these are all important considerations, we too often forget that most of these jurisdictions are governed by the lowest common denominator policy choices of legislators, few of whom have any major concern for the management processes that are applied to specific functional areas. Their "bottom line" is the recognition they receive from some general or specific public for doing the job for which they are elected. Reorganizations, the introduction of new fiscal managerial techniques, and related elements of management become a concern to legislators only when supportive interest groups are adversely affected, when expenses are high, or when a management process creates a specific problem with individuals who have access to the legislative process. More basically, perhaps, there has been a continuing inability to impress legislative bodies with the importance of the relationship of management to the policy and service delivery functions of whatever level of government is concerned(1). Within the intergovernmental assistance system this factor is observed in State legislative systems which generally approve without comment the receipt of Federal funds for functional planning and other related policy or management "studies," then use the funds, but seldom implement the recommendations if local funding is unavailable.

Service Standards

Almost completely ignored in our management planning, except perhaps by major metropolitan school districts and law enforcement agencies, has been the activism of the Federal and a few State courts in dictating service delivery areas (schools), establishing policy procedures (law enforcement and welfare), equalizing monetary expenditures in specified functional areas (education and welfare), and—most recently—equalizing municipal services in general(4). The possibility of this occurring in rural areas where the costs of urban types of services would be enormous, should be stimulating us to give this factor a more important place in our policy management improvement hierarchy(5).

Federal Follow-Through

The past decade has seen a major re-direction of Federal policy which has broadened the application of grants (a shift from specific to general functionalism), decentralized and standardized grant administration (Federal Regional Councils, Federal assistance review, integrated grants, etc.), stimulated substate regionalism (A–95 grant review), given State and local government greater discretion in the application of assistance both subjectively (general revenue sharing), and functionally (crime control, model cities, and community development), through a slight improvement in general management assistance (Intergovernmental Personnel Act), and through an on-again, off-again attempt to comprehensively manage the system through the Office of Management Budget. These are but a few of the many changes that might have had a revolutionary impact on the "system." Unfortunately, much has been promised and little achieved in the sense that recipients of governmental assistance cannot rely upon adequate enforcement of supposedly uniform conditions of delivery of assistance or the implied cooperation of the various conditions of delivery of assistance or the implied cooperation of the various functional Federal agencies. There is a major problem of follow-through gnawing at the foundations of that part of Federal assistance directed toward institutional capacity building.

State and Local Capacity

States and local governments sometimes have been truly "laboratories of experimentation" in adopting various policy and managerial techniques. Social Security and environmental control are examples of the former; program and zero based budgeting, city and county management plans of government, and wholesale re-organization exemplify the latter. But, with the number of sub-national governments, the various stages of ossification that typify some State legislatures where overall control of local government is lodged and a general conservatism about changing jurisdictional lines (either expanding or constricting boundaries) or forms of government when such matters are placed on the ballot, success is marked in inches, rarely in miles. School consolidation, the creation of substate regions, vast amounts of inter-local and inter-state cooperation, the newly arising strength of county governments in some States are all indicators that some change is possible. Yet, given the enormity of the problems and the size of the governmental universe, the progress made seems small by comparison. What we seemingly have not learned is that "evolution not revolution" characterizes basic change in most of the State and local institutions. Still we push the big dramatic reform, the panacea. In many cases we learn that the panacea, like the Federal aid pronouncements of the New Federalism, promises much but does not improve service delivery. We have never really seriously attempted to develop capacity-building management approaches that: (1) fit a fractionated, small government environment, (2) can be utilized for long term management application without excessive financial cost; and (3) does not disturb the valued political processes of so many of our citizens.

State and Local Diversity

Part of the problem associated with building State and local government management capacity is that management problems do not occur evenly throughout the universe of the States and local governments. Excepting for the moment the staggering financial problems of some of the biggest cities and school districts, State rules and regulations governing the conduct of municipal activities vary by State from accounting procedures to the governance of municipal zoos. Within such a system Federal attempts to be helpful in a capacity-building sense are too often undertaken without a sophisticated understanding of the system involved, are farmed out to consultants who use boiler plate from previous contracts, or academics who pursue policy rainbows, and frequently, the end products are used to either placate critics of a current administration or fill space on an agency bookshelf. We are only beginning to learn that "the difference does make a difference," and that capacity building can come only when the problems sought to be solved are approached with a firm understanding of the particular governmental arena within which the problem occurs. Some progress has been made with this particular subject with the establishment of the Federal Regional Councils and 4 years of missionary activities by some of the federal agencies (3).

The most often overlooked, and possibly the most important variable, concerns the abilities, background, and training of those individuals chosen for general management positions at any level of government. Too often we mistake policy leadership skills (the ability of sell a policy idea) with management skills (the ability to coordinate and deliver services within a system of fixed rules and resources). Part of this problem stems from the political environment in which the elected officials appoint and rightly so, persons, whom they trust to deliver at the policy level, often without due regard to the individual's general management background. Another proclivity is to elevate the functional specialist to a position of general management based almost exclusively on that person's technical achievement within a given functional specialty. This is the super-tech syndrome. Still another is to hire the person who will work for the least amount of money. This is the "entry-level at all costs" approach which saves money but usually results in policy and management (and eventually monetary) losses in the long run. If the current literature on capacity building is accurate, the skills required to manage capably are clearly those that must be learned both formally through educational processes and through general management experience. They are not those skills that are characteristic of the pure politician, the trained incapacities of the super technician who views the world exclusively through the techniques of a solitary discipline, or the beginner who will attempt to learn on the job. All of this is not true of all management positions but the nearest that any management group comes to this general management level is the formally educated, experiencewise city manager, who too often cares little about entering State or national service.

Governmental Management

As with other Federal policies, the general management function is little understood and less appreciated. An example is the original general revenue sharing law which precluded general management (*i.e.*, the hiring of a city manager or other support for general management activities, excepting financial administration) from financial support. Until such time as Federal assistance requires as much qualified management of assistance funds as it does certified accounting for use of the funds, a major deficiency will continue to exist.

Functionalism

Finally, even though a few intergovernmental programs such as the intergovernmental personnel program are broad enough in scope, though not in funding, the usual approach to Federal support of capacity building has been: (1) the band-aid variety concerned only with a certain function without regard to its place within a system, especially its relationship to a general management center; (2) purely cosmetic, as the Flying Federal experiment showed; or (3) it is for demonstration only, leaving the remainder of the universe to adopt the process if it works, if it is publicized, or if some other source of funding is available.

In summary, by our attempts to short-cut the realities of an extremely complicated and fractionated governmental system through the use of Federal stimuli to generate greater management capacity at the State and local levels of government, we have ignored a number of variables which defy immediate comprehensive change. We have chosen the intergovernmental system to attempt the quick-fix and now find ourselves as far behind as ever and without any immediate solutions available. After a decade of intergovernmental experimentation, demonstrations, and shotgun policies it is time to reassess and attempt to move the system to greater capacity by improving what we have, through general management advancement within the system.

This is especially crucial to what has been termed "rural America," which recently has become the center of national attention through the change in population patterns from the crowded Northeast to the rural South, and from a noticeable trend in migration from the central cities to the less crowded hinterlands. Facing the demands for urban services, economic development, and other needs of our industrial society, rural America is now under pressure to provide a better quality of life based upon improved governmental services. It has the opportunity to have hearned from past mistakes and seek the capacity to manage.

PRACTICAL APPROACHES TO MANAGEMENT IMPROVEMENT

If progress is to be made in improving the management capacities of American States and local governments, especially those in rural areas that may lack the management expertise to develop a management system that has capability, several redirections of policy at the Federal level should be undertaken. It should be noted that this redirection would require, in most cases, only the acceptance of the concept by those who make policy, and would not require new legislation. The following are possible:

1. Better coordination of Federal aid delivery to rural areas by the adoption of a growth center policy by all Federal grant-giving agencies with rural impact programs.
2. Consistent follow-through by Federal agencies utilizing those general management policies that are intended to improve the administration and coordination of Federal grants-in-aid.
3. Development of a "middle-level" management technology that is easily adaptable to the specific resources and management requirements of smaller jurisdictions.
4. Technical assistance or management support to smaller governments to apply the middle level management techniques within State regulatory requirements and the local environment in which the systems must operate.
5. Certification of public managers.

In addition to these improvements, legislation is needed to standardize the Federal grant delivery system so that more progress can be made in eliminating those legal and agency-imposed requirements which have proven to be insurmountable roadblocks to improving the coordination of grants-in-aid and providing Federal technical assistance that will have a capacity-building effect.

Implementing a Growth Center Policy

If we survey the financial universe which is available to rural governments to provide various types of assistance, we find it to be quite broad. For, in addition to direct grants of one type or another, there is also a substantial universe of loans, mortgage guarantees, insurance, and related forms of assistance. This aid is provided on an individual jurisdiction-by-jurisiction basis, usually without benefit of consultation with other departments or agencies as to how this assistance might relate to other Federal programs, to total community needs, to any State policy of local improvement, and to the needs and policies of related local governments. We also find that for every $1 of assistance available, in whatever form, there is a justifiable need for an additional $4 or $5 of assistance. Yet, each Federal agency continues to "go it alone" in terms of its own program. There are some exceptions, but they are few and lack continuity. This approach on the part of Federal and State governments fosters competition and confusion and results in the permanent placing of obstacles to any type of policy integration that is based on a comprehensive financial resource base for improving the delivery of local services. In so doing, it also becomes a major roadblock to the building of local management capacity. For, one of the requirements of capacity is that adequate financial resources are available to local managers.

If each piece must be individually sought, gained and managed, the game is lost in the first inning.

Initially, and for each Federal program, the question should be asked what is your strategy for allocation? What is the strategy in each State and its jurisdiction for the Rural Development Administration? What is the strategy for Economic Development Agency? What is the strategy for Community Development? What is the strategy for the Rural Telephone Bank? What are the various strategies for the programs under the administration of the Farmers Home Administration? What is the Labor Department doing in terms of Title I of the Comprehensive Employment and Training Act? What assumptions are each operating under in terms of the policy goals of each program?

All of these programs should be brought together at the initial planning stages and the goals and strategies laid side by side and compared. For those programs that distribute aid or render other types of assistance, the jurisdictions that are affected should be treated as single policy objectives by all the agencies who furnish aid. Selection of the recipients can proceed by the most logical of means—those that have the potential, the need, are the subject of State assistance, and related criteria. This then becomes a directing of all types of assistance on a coordinated basis toward growth centers or centers of need. It would provide the subjects of assistance with a broad range of tools with which to work.

The difficulty in this approach, and it has been applied to planning through integrated grants and informal attempts at coordination, is that Federal agencies never initiate, and (given the lack of management capacity by most of the rural jurisdictions) there is little potential for preparing a locally generated comprehensive proposal. In addition, the bringing together of Federal program officials, whether it be at the central, regional, or field office level, is that each agency treats each program as having separate and individual long-term policy goals. Yet, any close examination of the long-term *policy goals* of domestic assistance, as it is usually stated in the enabling legislation, will reveal an amazing similarity. What is different are the immediate *program objectives* of each. This confusion of ends is a major contributor to the lack of cooperation that is evident at the Federal level. If the agencies could cross this strategy threshold, sit down together and allocate to the strategic points of need, progress toward consistency in building capacity at the local level could be expected. But, it will require more Federal management initiative and cooperation than is now provided to even begin this process.

Federal Management Follow-Through

In 1968, a major breakthrough in giving the Federal agencies the coordinative tools they need to assist State and local governments and loosen the extremely functionally-oriented grant delivery system was provided through the passage of the Intergovernmental Cooperation Act. As a result of that and the Federal Assistance Review (FAR) program, the Nation received common regional boundaries for domestic agencies, Federal Regional Councils, and a new thrust toward management improvement by a number of Federal management circulars (the "A" system, later implemented by the Federal Management Circular system.) Internal to the management system circulars A–95 and A–102, integrated grants, the regional grant information system, elimination of single State agency requirements, annual arrangements, planned variations, chief executive review and comment and other demonstrations implemented on a selective basis. Yet, today, most have been discontinued and those that remain, with the possible major exception of the Environmental Impact Statement process, are moribund. A–95 review is effective in only a small proportion of the States and regions. Substate regionalism is working in some places, but has been effectively castrated in others. A–102 is still not adhered to by all Federal agencies, and the Federal regional concept is bypassed whenever possible.

Most of these "experiments" have died or atrophied because of the tenacity of the Federal agencies in clinging to their functional prerequisites. Whenever and wherever States and local governments have looked to the Office of Management and Budget for enforcement of any of these devices or suggested the OMB's legislative review process would be a way of incorporating management improvement processes into new intergovernmental legislation, they have been met by the excuse that OMB cannot impose. Agencies and departments, it seems, still dominate the management process.

There is little profit in beating OMB or the functionalists in the agencies over the head with their policy and follow-through shortcomings. Until such time as there are policy managers imbued with the longer range goals of public policy as it is expressed in intergovernmental legislation, the capacity-building abilities of the Federal level of government will be in question.

Middle-Level Management Technologies

E. S. Schumacher, an English economist, has spent a great deal of his career dealing directly with the problems of converting primitive non-producing societies into producing societies in terms of agricultural progress, etc. (7). He has found in Africa and Asia that the introduction of sophisticated technology was not practical because of the inability of the individuals to handle it. Instead of devising means by which peasants could operate sophisticated trucks to get their produce to market, Schumacher and his colleagues invented ways of using or improving draft animal transportation; instead of introducing tractors and prairie plows, they applied their skills to developing more efficient animal-pulled plows, and innovated in a number of ways that would not require the sophisticated application and maintenance of more technology. This approach has been very effective.

Many of the problems faced by primitive societies in the hard technology arena, are duplicated by American local governments in the field of management. If we examine the management variables that most experts claim are needed for management capacity building, compare these with the informational and system elements of a sophisticated management system, and then examine the need and management expertize that is available in the less densely populated governmental units in the United States, the same questions of applicability raised by Schumacher are evident. Small jurisdictions employing 150 employees (or less) generally cannot utilize personnel systems that are designed for a minimum of 500 employees. Modern program budgeting systems designed for expenditures of millions or billions of dollars are hardly applicable to the expenditures of thousands or a few millions of dollars. Complex planning techniques in large units of government might be very much out of place in towns and villages. In each and every case of small government, there is a need for comprehensive management planning and support systems that can be maintained by generalist, usually not professionally trained, employees, and whose applications can be understood and supported by elected public officials who are not accustomed to the complexities of large governmental operations.

Governmental management experts (and the examples are legion) tend to take a *sine qua non* approach to small government management systems. For example, personnel systems are designed that would require full-time personnel specialists to maintain the record keeping systems for units of government that haven't the resources for full-time personnel staffs or the need for computer techniques to process employee records. Improved budgeting recommendations are often based upon the application of sophisticated estimation methods used by the Department of Defense. Few if any consultants (governmental or private), when faced with administrative planning problems in small units of government, will make the effort to translate the jargon used by organization and methods specialists into operational instructions that can be applied by individuals who lack a professional background in the use of these techniques, and who, if they did understand, might reject many as unappropriate for local applications. Much the same situation exists in the physical planning field, where in-house capabilities are recommended rather than some intergovernmental process by which groups of smaller governments could cooperate in land use planning.

Given the amount of money that is expended by governments, large and small, in attempting to keep management in pace with the increasingly complex world of laws, rules and procedures—especially through training, consulting, and the introduction of computer-based technologies—some intergovernmentally stimulated program of systematically examining and altering the basic management processes would probably yield an immediate, high return. Thus, if the personnel, financial, planning, and support systems of small governmental management were treated as interrelated wholes, rather than as independent parts of systems, management specialists could probably develop simpler, more easily adaptable small government management practices which, when implemented, could be the basis for the building of capacity.

Adaptation of Middle-Level Systems to Specific Governmental Environments

In addition to the need for middle level management technologies, far more emphasis should be placed on implementing these systems within specific local governmental organizations, and within broader State regulation procedures. Far too often the biases of rational organizational disciplinary requirements of theory as they are translated into structures and procedures are recommended regardless of the organizational arrangements within which they must be applied.

For example, a small rural county will probably be composed of several governmental organizations. An elected county board will be responsible for some of the more general functions of county government, an elected sheriff for the law enforcement phase, an elected treasurer for financial purposes, and other elected officers will be found to further complicate the management of government. The public, unless aroused, tends to view this as one system. If we are to develop a practical capacity-building organization process, each of these elements should be considered as internal to the total organization. In most cases, we tend to either recommend total organizational change, or assume that all of the independent elements will be included in any basic management process. A more effective approach to the problem of fragmented governments would be to recognize this complexity in basic organizational structure, treat each independent entity as separate, and build into management recommendations the capacity for independent political offices to merge their basic management procedures without sacrificing operational independence. It might be conceptually messy to attempt this, but it must also be acceptable to the users. Our problem is to determine whether or not we are talented and creative enough to work with these variables and develop a capacity-building capacity for smaller units of government whose organizational base is fragmented.

In a similar vein, the process of developing standard organizational procedures for governmental units seldom concerns itself with the complexities of State regulation of local government. Administrative processes are very much affected by State laws and regulations. Most commonly, personnel and budgeting are the subject of different approaches by the State, although many other discrete functions are also included in State regulation. At the present time, a number of leagues of municipalities and county associations provide basic reference and ordinance services that incorporate these State strictures. However, few of the public agency associations make available organizational consultants or organizational strategies that link the key managerial processes to the basic law that governs their operation in the State. Consideration of this element adds another element to the complex chore of developing a middle level strategy of capacity building which can be implemented in any specific jurisdiction.

At the Federal level some assistance is being provided by the intergovernmental personnel act (IPA), but its personnel and training focus severely limits its application to a broad based effort to improve management capabilities. What is required is an intergovernmental management assistance program, perhaps modeled on the IPA, but which would have a general capacity-building goal.

Certification of Public Managers

Since our governmental management system is characterized by the apprentice system and Managerial Jacksonianism (which can loosely be defined as the assumption that any citizen can manage a public program), the time is right to begin a certification process that will authenticate the educational background, and perhaps the experience of an individual in terms of an expert understanding of the subject matter and managerial processes that form the basis for what is currently defined as governmental capacity building. Certification is certainly not new, but its applicability is less than universal.

Many units of local government will hire only professionally trained city and county managers. But more will hire individuals who are completely lacking in an educational background in governmental management, or who have experience in general management. In addition, functional specialists are often assumed to be qualified to assume general management responsibilities.

The Federal Government in the intergovernmental system has often required professional certification for individuals managing programs, but these have tended to relate to the functional grant-in-aid system. Thus, the "701" program required the Department of Housing and Urban Development (HUD) certification of project directors before funds would be forthcoming. Similar professional qualifications have been applied to other specialties such as health, welfare, and transportation. All grant-in-aid programs require that Federal funds be accounted for by individuals and firms that have been certified and bonded to accomplish these particular chores. Yet, even in cities that handle millions of dollars in Federal assistance, the qualifications of the general management directors are seldom questioned as a prerequisite for receiving Federal assistance.

In a grant-in-aid system in which there is either no concern for the general management abilities of local or State managers, or where the system is so functional that the different specialty professions are adequately represented, there is no need for generalists with a proven academic background and management accomplishment. But, if the goal of the intergovernmental system is to build capacity, then virtually every unit of government which contributes to that goal should have in its employ, or have accessible through some formal arrangement, a certified public manager.

There is more than a little conflict in management and academic circles that such a certification process would be accurate and viable. However, within the past decade education for the public service has been modified and made far more professional than it ever was. There are a number of qualified individuals in both government and management who believe that the time is propitious for a certification process. It seems likely the National Association of Schools of Public Affairs and Administration, which has already developed various "recommended" standards for undergraduate and graduate programs in public administration, will in the near future move toward educational accreditation. If they do, it will be but a short step to individual certification.

Federal stimulus toward denying or curtailing the application of grant-in-aid funds to State and local jurisdictions which do not employ generalist professionals would go far in advancing a general capacity-building ability in these governmental units. In the event that Federal intergovernmental programs are developed for capacity-building purposes, or that the use of portions of existing programs are dedicated to that purpose, this requirement would go far in achieving the goal of having individuals in positions of authority who understand the need for coordination of functions and are capable of managing those systems once they have been developed.

Legislation

During the closing days of the second session of the 94th Congress, the Federal Grant and Cooperative Agreement Act of 1975 (S. 1437) was passed. Vetoed by the President upon the advice of OMB, the legislation called for a comprehensive examination of the total grant-in-aid system in a way similar to that which was used to examine and ultimately improve the Federal procurement process. Had the legislation been passed, the executive structure of the Federal government would have been required to reexamine the total intergovernmental delivery system with a view toward standardization of regulations and rules. It would have resulted in Federal agencies treating each recipient of grant-in-aid assistance on a level consistent with their management capabilities. Such a stimulus, if properly enforced, would have gone far in developing a governmental consciousness of the importance of good management of Federal grants-in-aid. Spill-over could send this message throughout the system. It would have provided a congressional input that has been sorely lacking; for Congress has never had an interest in management techniques and how their proper application would improve the programs that it authorizes. Like the executive branch of the Federal Government, it has been a collection of policy functionalists, unaware and apparently unconcerned about the interrelationships of the various parts of the "system." Until both the Congress and the executive branch do something positive, capacity building at the local level, and in some States, will not occur. The Federal Grant and Cooperative Agreement Act is, hopefully, an indication that a positive push toward practical capacity building can be stimulated and sustained at the national level.

AN ACTION AGENDA

At present, capacity building is more conceptual than real. It is time to operationalize and apply the techniques and strategies that we now feel will give us the ability to manage the public sector effectively, especially with regard to smaller and less densely populated governmental units. To accomplish this, more emphasis should be placed on the development of comprehensive, middle-level management techniques and systems. Management research has tended to over-emphasize components rather than total governmental systems. The components, whether they apply to the management of highway construction, or to the development of new budgetary processes, are only parts of larger systems. Support of management research in universities and public research associations would go far in stimulating the practical implementation of management capacity.

Federal agencies hold the key to an expansion of capacity building at the local level. More emphasis on management capability within the grant-in-aid system, especially an insistance that all management components relate to general management capacity is crucial. Programs like the recent HUD program to support consortia to provide field services to small local governments are a small start. A broader approach by the Department of Agriculture, utilizing extension and research organizations in the various land-grant colleges, would seem appropriate. When we talk about capacity building, we imply small rural government. Rural government relates to Department of Agriculture responsibilities.

In addition to the sponsorship of research, two major educational efforts are necessary. The first is a professional public administration curriculum that is directed toward the management of small resource units of government. The development of rural management centers, staffed by experienced professionals, could provide a needed service by offering graduate management curricula and providing in-service training. The second educational need is for continuing education for elected officials, appointees to zoning and planning commissions, and public interest group members who are often imbued with notions of small limited government, but who must relate to a more sophisticated governmental environment. If government has changed, and no one would doubt that it has, so must our thinking processes.

Real progress will be made only when we take the important step of translating our conceptual efforts into applications. Now is an appropriate time to begin.

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INTERGOVERNMENTAL COOPERATION AND CONFLICT IN CANADIAN RURAL DEVELOPMENT PROGRAMS

[By Leo F. Kristjanson*]

Intergovernmental cooperation and conflict in Canadian rural development programs was selected as the focus of this paper because the need for massive governmental involvement was evident from the start and the multitude of conflicts of interest within government became apparent so early in the program. Rural development programs became necessary when the forces unleashed by settlement policies and technological change began to yield results judged by many to be socially, politically, and economically unacceptable. It then becomes necessary to examine how governmental agencies and structures at all levels interact to advance or hinder rural development.

The topic selected has once more forcefully illustrated the continuing relevance of the work of John R. Commons. Little of relevance could be said about the Canadian rural development experience within the confines of the mathematical agnosticism that so heavily influences economic literature at present. To understand the relationships, roles and interactions of governmental units in the pursuit of the goals of rural development, it is important to recognize as Commons did, that:

> . . . every choice of every official in every authoritative transaction, within his field of power and immunity, is the exercise of a public purpose directed towards proportioning the inducements which collective power creates. It is his behavior accompanying his mental habits, his ideals, definitions, investigations, classifications, valuations and purposes which throw the weight of the concern on one side or the other in determining the part which individuals and classes play in the collective economy.[1]

The "officials," of course, operate within the institutional constraints of constitutions, laws, and governmental forms. However, the elasticity of these constraints is considerable when public purpose is clearly understood, and the officials are firmly committed to that public purpose.

In Canada, as in the United States, the last two decades have produced a significant increase in the number of policies, programs, and research reports directed toward achieving something called rural development, or regional development. What appears to make these studies and policies distinctive is their emphasis on the interdependence between the agricultural sector and the remainder of the non-metropolitan area of the country. Whereas the majority of earlier studies

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[1] John R. Commons, *Legal Foundations of Capitalism*, p. 385.

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focussed on the farm as a business enterprise, or agriculture as a sector in a growth model, the literature of the sixties and seventies began to focus on agriculture's relationship to local and regional economies. There seemed to emerge a consensus that the pursuit of efficiency in production at the farm level and maximization of contributions to economic growth at the sectoral level were leading to some undesirable social consequences. Some participants in the debate suggested further that the existing system would almost inevitably lead to problems of sub-optimization and that a public sector involvement would allow a minimization of this problem.

A reasonable interpretation of rural development legislation is that it is an attempt to make available to the non-metropolitan areas some stabilization of population size and a more equitable share of the nation's productivity. Unfortunately, the pursuit of such goals is likely to activate programs and activities whose pupose is to neutralize rural development. The redistribution of power and wealth among governments and population groups cannot be achieved without a struggle. Recent Canadian experience with rural development programs attests to this.

THE CONSTITUTIONAL VERDICT ON RURAL DEVELOPMENT

A major influence in the creation of Canada, by means of the federation of a number of colonies, was the perceived need to have a governmental structure capable of developing the agricultural resources of Western Canada. To fully recognize the central role of agriculture, the Canadian Constitution provides for concurrent jurisdiction. Section 95 of the British North America Act states:

> In each province the legislature may make laws in relation to agriculture in the province—and it is hereby declared that the parliament of Canada may from time to time make laws in relation to agriculture in all or any of the provinces . . . and any laws of the legislature of a province relative to agriculture shall have effect in and for the provinces as long as and as far only as it is not repugnant to any Act of the Parliament of Canada.

The practical effects of this have been to cause almost endless Federal-Provincial conferences, numerous coordinating committees and, where the welfare function perceived by a Provincial Government differs from the one perceived by the Federal Government, power struggles between levels of government. The third level of government (rural or urban) involved in development is, under the Constitution, a creature or ward of the Province.

The constraints of the Constitution are particularly significant when national policy affects areas with radically different welfare functions. Canadians have long been conscious of the differences between the demands made on the public sector in the different Provinces. A recent election in the Province of Quebec provides conclusive evidence that a large group within Canada are not satisfied with the value systems inherent in Federal program priorities. They wish, at a minimum, to alter the governmental institutions so that their values can be better reflected in policy. Since many of these values are rural values, the constitutional strains Canada is now experiencing are a reflection of some of the failures of past rural development policies. It should be noted that the protests recorded in the Quebec Provincial election have their counterpart in all other Provinces—though not in as clear or concise a form. A common element in Provincial dissatisfaction with current constitional arrangements is concern that Provincial Governments do not have sufficient control over their natural resource policies to allow them to properly pursue the provincially-determined goals.

The strains on our Federal system were apparent long before the election. One of Canada's leading political scientists, Professor D. V. Smiley, observed:

> . . . In summary then, a constitutional division of powers between national and regional governments cannot under modern circumstances resolve problems caused by geographical diversities . . .
>
> "It is the argument of this paper that in the Canadian federal system territorial particularisms have come to find outlets almost exclusively through the provinces. This situation has come about largely as a result of the working of the institutions of the central government which from time to time operate so as to deny provincial and regional interests an effective share in central decision-making.[2]

If Smiley is correct one would anticipate a great diversity of rural development policies across Canada, and a participation by the Federal Government which does not go much beyond the lowest common denominator—probably money. A review of Canadian policy, however, reveals determined Federal efforts to maintain nationwide standards in their policies. Policy developments can probably be best understood by recognizing them as attempts to establish new compromises between Federal standards and local values.

Unfortunately, the balance between resources and responsibilities in government tend to be uneven. The responsibilities of the Provinces, under the Constitution, are those where increased demands for expenditure have been the greatest. But the growth in governmental revenue has been at the Federal level. With such pressures, one would expect to find a tendency toward centralization of programs. However, since Canada has only ten Provinces and since the Canadian court system appears to have favored decentralization, the Canadian programs appear to be more decentralized than those of the United States. This in spite of the fact that a reading of the constitutions of the two countries would probably lead to the contrary hypothesis.[3]

A political economist is more likely to view the problem in terms of the lack of congruence of economic policy regions and socio-political policy regions.[4] Rural development programs require participation of sub-provincial socio-political units in the process. In Canada, this has appeared to cause less difficulty than in the United States—in part because of the greater decentralization of power, in part because these units are so clearly creatures of the provincial governments, and in part because in most Provinces these units are so small that they are ineffectual for planning purposes and have not combined their efforts sufficiently to exercise significant power. The key actors then in the Canadian programs for development in the non-metropolitan areas are the Provincial and Federal governments in that order.

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[2] D. V. Smiley, "The Structural Problem of Canadian Federalism", *Canadian Public Administration*, Fall, 1971.

[3] For a comprehensive discussion of this problem see: Ronald M. Burns, "Intergovernmental Relations in Canada", *Canadian Public Administration*, Vol. 28, 1968.

[4] A view of some of the major difficulties of Canadian regional development policy can be found in: L. F. Kristjanson, *et al. Summary Report on Regional and Urban Policy in Canada*, a Report to the Economic Council of Canada, Ottawa, 1974.

AN OVERVIEW OF THE CANADIAN EXPERIENCE

Canadian rural development policies have evolved within an overall agricultural policy bearing significant resemblances to the agricultural policy of the United States.[5] The land and other policies to encourage rapid settlement were almost identical. It was not until the crises of the 1930's that Canadian policy gave recognition to the need for governments to be involved in a significant way in rural development programs. Intergovernmental conflict, at this time, was not a serious issue since Provincial Governments were clearly incapable of providing finances for any new programs. Nevertheless, it was necessary to recognize the regional differences and to establish two distinctive programs for the major problem areas in the country.

The Prairie Farm Rehabilitation Act (PFRA) was passed in 1935. It was conceived as a program of resource improvement as a means of dealing with the disastrous conditions of the 1930's in Western Canada. Repeated crop failures and widespread farm abandonment led to the development of a comprehensive program of water development and a system for converting to permanent pasture those lands that appeared to be submarginal for crops. In addition, some research and encouragement of improved farming methods was undertaken. What distinguishes the PFRA program from later rural development programs is that it focused on the non-human resources almost exclusively, and that in spite of changes of political patronage the program did not lead to serious intergovernmental conflicts. Numerous evaluations of PFRA confirm that in spite of the emergency nature of its origins it has provided long-term planning and benefits, encouraged some diversification of agriculture, and, by virtue of the rules governing access to its pastures, provided for some very minor redistribution of income to small and medium sized farm operations.[6]

The rural areas of Canada's eastern provinces have for three decades experienced low income, high unemployment, and high out-migration in comparison to Canada as a whole. Federal politicians from this region pressed hard to obtain a counterpart to PFRA for their region. The result was a more modest program called the Maritime Marshland Rehabilitation Act (MMRA) intended to protect agricultural land from salt-water flooding in the Provinces of New Brunswick and Nova Scotia. Again, the program was resource-oriented rather than people-oriented. No significant intergovernmental conflicts arose over this program. Thirty years after the introduction of MMRA there seems to be fairly general agreement that it did not lead to more intensive utilization of agricultural resources in that area. It did, however, provide nonfarm benefits in the form of temporary employment opportunities and some improvements in the transportation for the area.[7]

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[5] For comparisons of Canadian and United States agricultural policies see: G. E. Brandow, "Conflicts and Consistencies in the Agricultural Policies of the United States and Canada", and J. C. Gilson. A Canadian View of Conflicts and Consistencies in the Agricultural Policies of Canada and the United States", *American Journal of Farm Economics*, Vol. 5.

[6] See: Helen Buckley and Eva Tihanyi, *Canadian Policies for Rural Adjustment*, Ottawa, Economic Council of Canada, 1967.

With these precedents for Federal intervention on behalf of distressed rural areas the Government of Canada passed, in 1961, the Agricultural and Rural Development Act (ARDA). This was to be a program operative in the low-income rural areas of all of the provinces. In spite of promises of new directions and new emphases, the early years of the ARDA saw a continuation of the land-resource orientation of the earlier programs. No doubt this was in part due to the existence of the appropriate research and manpower infrastructure. The failure to devote attention to the management and capital needs could also be attributed to the greater political sensitivity of programs dealing with those factors. Included in the early ARDA program was a very significant emphasis on social and economic research. The significance lay not in the total amount allocated, but in the fact that previously almost no research had been done in this field and now it received the majority of research allocations. Buckley and Tihanyi suggest that in addition to the new knowledge developed with these funds, the fact that the issues were being debated by researchers led to much more realistic views of the need for genuine adjustments in the rural economy.

In moving from the regional emphasis of PFRA and MMRA to the national emphasis of ARDA, it was necessary to establish new methods for intergovernmental participation. The device used was to develop a master agreement signed by all Provinces and the Federal government, followed by sub-agreements for specific projects. This allowed the Provinces to adapt the program to their perception of priorities within certain constraints set out in the master agreement, which presumably reflected national priorities. It is worthy of note that the first phase of ARDA, though making references to the need for local involvement and initiatives, provided no specific opportunities for local units of government to participate.

The first agreement between Governments lasted for 5 years. Its success was sufficient to ensure the successful renegotiation. By this time Governments apparently believed that the research and manpower available allowed a new thrust to rural development programs. Indeed, the new thrust had been evolving as pressures to provide development of a type clearly visible at the local level to supplement the adjustment out of agriculture appeared necessary to attain better non-human resource utilization. It is understandable that the central Government will be more adjustment oriented and the Provincial and local Governments more development oriented. The perceptions of a problem by those responsible for an economic management role (the Federal Government) are bound to be different from those responsible for providing services such as education, health, and welfare (the Provincial and local Governments). Since the political process will lead to the judgment of adequacy of performance in terms of how well governments meet their particular responsibilities, it is understandable that the perception of the problem by local officials as development rather than adjustment is reinforced.

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[7] *Ibid.*

The second ARDA agreement looked to resolving the intergovernmental conflicts inherent in the evolving perceptions of the problem by establishing special areas with provincial boundaries and negotiating sub-agreements for those areas. It was this new emphasis that led to a closer examination of the interrelationships of non-metropolitan urban areas to the rural development program. The wisdom of this emphasis became clearer as research evidence became available concerning the problems of providing services to the remaining residents when adjustment (out-migration) had drastically lowered the density of population. Other research was pointing to the fact that many of the rural poor were unable to make successful adjustments to unfamiliar environments. Area planning provided, it seemed, the best hope for dealing with both the political problems and problems made evident by the research.

Area planning, however, forced the recognition of the critical role of local governments and groups. Their involvement had to be governed by the actions of Provincial groups and Federal control began to lessen. It also became more likely that Provincial and local Governments would find more opportunities to utilize this program to substitute Federal funds for programs and activities that would have been undertaken in any event.

The second ARDA agreement contained two other new features of importance. In order to allow better pursuit of the adjustment objective, funds were made available to acquire farms and woodlots valued below a particular level—presumably the lower productivity lands. Grants were made available to assist in farm consolidation. Where farm consolidation was taking place with insufficient employment opportunities in the rest of the economy of the area, it was possible to use ARDA funds to create non-agricultural employment. The combined effect of this expansion was to further intrude into the traditional roles of provincial governments and to involve a wider range of government departments in the whole process. The resolution of intergovernmental conflict was becoming more critical and the added barrier of intragovernmental conflict became more apparent.

Though the focus of this paper is on governmental activity it must be recognized that the whole process was geared to resolving problems left by the operations of the private sector. Conflicts between governments and the private sector have not been significant in the ARDA program. This has been more due to the irrelevance of ARDA programs to the major forces in the private sector than to anything else. Indeed, the continuing pressures of vertical integration probably ensure the continuing need for programs of the ARDA type.

The gradual expansion of the number of factors to be taken into account in rural development led finally to the transfer of ARDA activities to a new Federal Government Department called the Department of Regional Economic Expansion. By implication, the Federal Government has accepted the role of development agent rather than adjustment agent. However, for this program the initiators still appear to be the Provincial Governments with the Federal Government entering only as the financier.

An Act of Parliament passed on the understanding that there was a strong need for improving agricultural incomes and resource utilization is now being used to alleviate regional income disparities. The measures of success are numbers of jobs "created," degree of population stabilization, and the extent of improvement of regional incomes in relation to national averages. By these criteria, the program appears to have been sufficiently successful to warrant its continuation.[8]

Two major deficiencies persist. First, the program has not assisted in any way the development of a comprehensive manpower development program. The major focus continues to be on the non-human resources. Because so much of the social infrastructure is the responsibility of local governments, the expenditures in this area are much less than long-term returns would justify. Local governments are the weak partners in the planning and implementation of programs. Thus, the development of infrastructures tends to be guided by minimums required for the job creation process, rather than by the potential returns to investment or the needed improvements in the quality of life for the residents of the area.

The second major deficiency is that the transfer of the program to the Department of Regional Economic Expansion has led to such a de-emphasis of agricultural adjustment that a new program within the Federal Department of Agriculture has been created. A cynical view might be that the transfer of ARDA activities out of Agriculture has necessitated new justifications for staff, or that the new programs are part of an intragovernmental power struggle. While these factors may be involved, a strong case can be made for the Small Farm Development Program. The general purpose of this program has been identified by a senior civil servant as ". . . to enable the owners of small, uneconomical farm units to attain equality of social and economic opportunity with other Canadians".[9] Thus, the Department of Agriculture has returned to its adjustment objective under a new program, and has left the development objective to be met by the activities of its sister department. The extent to which coordination of the two programs will be achieved remains to be determined.

The new Federal program for farm development still requires a significant amount of cooperation and coordination with the Provincial Governments. However, the Federal Department has retained somewhat greater control in the new program by substituting total Federal financing for the shared financing of the earlier ARDA programs. Provincial Governments must then decide whether the negative political consequences of participating in a program admittedly aimed at decreasing farm numbers is offset by the advantages of flows of Federal funds into the provinces.

Intergovernmental and interdepartmental cooperation remain as important in the new program as in the old in spite of the return to more limited objectives. A senior civil servant had this to say:

> The institutional arrangements required for the implementation of the Small Farm Development Program involve the development of Federal-provincial agreements, the

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[8] For an assessment of the program in a restricted area see: J. A. McMillan, C. Lu, and C. F. Farmingham, *The Manitoba Interlake Area: A Regional Development Evaluation*, Iowa State Press, Ames, 1975.

[9] D. H. Plaunt, "Development Policies and Programs in Canada", *American Journal of Agricultural Economics*, Vol. 55, No. 5, 1973.

> operations of a Federal-provincial policy committee at the national level, the operation of an interdepartmental committee within the Federal service, and the provision of the research and secretariat services required to enable these institutional arrangements to operate effectively.[10]

In spite of the central role of Government cooperation in Canadian rural development programs, there are no research studies that focus on this problem. There has been no systematic analysis of the extent to which the public sector should be involved in trying to resolve the problems identified, nor have there been studies considering the merits of the different techniques governments have used to try to achieve cooperative effort.

THE LESSONS OF THE CANADIAN RURAL DEVELOPMENT EXPERIENCE

This short paper could not possibly review all of the multitude of programs that impinge upon the rural development process. The author is painfully aware that housing programs, sewer and water programs, health programs, education programs, and many other programs developed independently of the rural development programs are, nevertheless, critical to their success and should properly have been discussed in this paper. But the more limited examination of the major programs emanating from Departments of Agriculture should suffice to illustrate some useful general principles.

The first and most general lesson of the Canadian program is that in a Federal state very substantial efforts at coordination are required, and the background knowledge and research in the field is extremely limited. And, while much is said about the need for local initiatives and local involvement, even less is known about what is required to get coordinated efforts from local levels of government. The state of the art seems to be for the senior level of Government to use the earmarked grant to obtain the desired behavior from the next level of Government. Refinement of this tool consists of altering the size of the grant or providing greater specification of the criteria of eligibility.

Closely related to the problems of coordination—perhaps even a cause of those problems—is the awkwardness of the bureaucratic system when it faces significant differences in values, goals, and objectives at different levels of Government or community organization. The package of public goods desired by one area may be very distinctly different from that desired by another area. One may argue that they are, in Galbraithian terms, "contrived wants" whose status in the priority rankings is a product of the activities of the very government that is insisting that it must retain its priorities. These priorities, nevertheless, are real in political terms. Frequently, too, this package of public goods is the product of unique environmental conditions. Sparsely settled areas with difficulties in obtaining access to markets and health services are likely to give high priority to improvements in the infrastructure that will provide that access. Bureaucratic procedures and centralized administrations have difficulty in coping with these differences. While Canadian legislation and programs appear to place considerable emphasis on local involvement and initiatives, the degree of decentralization of administration and power is very limited. Neither local initiatives nor local values can be properly included in development programs under such conditions.

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[10] *Ibid*, p. 908.

Canadian rural development programs also provide numerous examples of intragovernmental conflict. Departments of government are organized on a sectoral basis—but the problems are not. The result is numerous coordinating committees whose members must overcome very significant pressures from their own Departments in order to effectively participate in the committees. All too often the result is that the planning activity lacks the breadth to make it successful. The weaknesses of the system are somewhat offset by the ingenuity of people at the local level. Their effect has been summarized as follows:

> The result is that clients, whether they be individuals or groups, with respect to provincial programs; or provincial governments, with respect to Federal programs; tend to respond, not in terms of the requirements of their real problems, but in terms of calculating how they can best obtain the funds available.[11]

The funds may then not be optimaliy allocated with respect to their intended purpose. However, those closest to the problems have an opportunity to direct spending, within program constraints, to meet the needs of the area.

The Canadian experience illustrates that in spite of the repeated recognition that any development process is, by nature, dynamic, little attention has been given to how one maintains a mix of flexibility and long-term planning. Some recognition was given to this problem in the early programs by including a significant research expenditure requirement. The degree of recognition that could be given was limited by the research manpower available. The evolution of the program toward more comprehensive planning and more local involvement can be attributed to the early research and thinking. But, we now appear to be moving into an era of reaction and conservatism with the majority of the research being "evaluation" of existing programs to provide justification for program continuance, rather than analysis leading to new approaches.

CONCLUSIONS

Canadian rural development programs can be considered successful in that they can point to improved resource use, benefit cost ratios of more than one to one, and increased coordination of participants in the development process. Applying the criteria of removal of poverty, removal of regional income disparity, or population stabilization, the program appears less successful. Applying the criteria that a program dealing with a dynamic problem must create a dynamic planning process, the program again appears to fall short.

This Conference was to focus on research on community services. This paper was to focus on Canadian rural development experience. It is difficult—if not impossible—to do both. The contribution, if any, of this paper is to identify a desperate need for a new focus for research in the Canadian rural development program. Unless there is some basic research done in a number of areas the program will continue to be land and resource oriented, rather than people and organization oriented. In an attempt to justify expenditures, the limited research funds have been devoted to very applied research and evaluation research. In the physical sciences, on the other hand, the significant allocation of funds to basic research allow the continual development of intellectual capital on which new programs can be based. The most critical research needs are:

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[11] L. E. Poetsche, "ARDA and Poverty—Lessons in Development Planning", *Canadian Journal of Agricultural Economics*, Vol. 16, No. 3.

(1) An examination of the governmental and public administration processes to find ways to minimize intergovernmental and intragovernmental conflict;

(2) An examination of the institutional relationships of levels of government to determine what changes are required to insure that the relationship of powers to responsibilities are appropriate to new conditions, and that there is sufficient flexibility to allow for the differences in values across the country; and

(3) An examination of the interface between the private and public sector, as it impinges on rural development.

This paper began with an expression of concern that the mathematical agnosticism of much of the current research is causing failure to consider imaginative approaches to achieving society's goals of development and adjustment. A new focus for research must be specified to provide the base for future programs, and this should be institutional research. Progress to date is encouraging, and there is every reason to be optimistic concerning the future.

COORDINATION AMONG AGENCIES FOR RURAL DEVELOPMENT: SOME CURRENT RESEARCH AND POLICY NEEDS

[By Gerald E. Klonglan*]

One of the major problems frequently identified in efforts to bring community services to nonmetropolitan areas is the lack of coordination among relevant organizations. Increased interorganizational coordination has been seen as an important need to deal with the problems of organizational duplication and overlap on the one hand and lack of integration of organizational programs, with resulting service gaps and oversights, on the other.

In regard to the delivery of services to rural America, Section 603 of the Rural Development Act of 1972 directed the Secretary of Agriculture to coordinate a nationwide rural development program that would build on past coordination efforts but also search out new opportunities for improved interagency coordination that would result in better delivery of Federal services to rural people. The Third Annual Report of the Secretary of Agriculture to Congress summarizes many of USDA's recent development coordination efforts (39).

The major purpose of this paper is to review some of the meanings of coordination and to suggest research that will help us better understand how to more effectively create coordination among organizations responsible for providing community services to nonmetropolitan areas. A general research framework for studying coordination will be used to organize past research efforts and to provide a guide for considering needed research activities.

A secondary purpose of the paper will be to suggest some preliminary policy implications for organizations and community leaders based on the very limited coordination research completed to date.

COORDINATION: AN AMBIGUOUS TERM

A survey of research and administrative literature will show the term coordination means many different things to different people. At a general level, writers may agree that coordination is a process by which the efforts of two or more organizations are brought together to solve a specific problem. There are, however, several key distinctions that can be made to differentiate different kinds of coordination.

Coordination Between Whom?

There are three almost independent bodies of scholars studying domestic coordination, based on which organizations are the focus of study. One group focuses on coordination between different levels of government, *i.e.*, between national, State, and local units of government. This is usually referred to as the study of intergovernmental relations. The focus here is primarily on vertical relations between public organizations. A second group of writers focuses on coordination between similar kinds of organizations across communities, i.e. the development of councils of governments or other types of multi-county (or multi-city) intergovernmental units (1, 2, 14). A third group of writers and researchers has focused on coordination between different kinds of organizations within a given local community (city, county or area), *i.e.*, the development of linkages between a social service agency, a school system or a job service corp, in one community to help train and find jobs for unemployed rural people. Some rural communities have Youth Service Coordination Councils where traditional youth organizations (such as Boy Scouts, Girl Scouts, 4-H, Boys Clubs, Church Youth Groups, etc.) join together to plan and implement youth programs. The remainder of this paper will focus primarily on this third focus of coordination, although many of the ideas will be general enough to apply to the other two situations as well. One of our priority research needs is to compare and contrast the similarities and differences of the process of coordination in these three different kinds of coordination settings.

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Coordination: Cooperation, Competition, and Conflict

Another aspect of the meaning of coordination is to determine whether coordination is a synonym for cooperation, *i.e.*, coordination among organizations equals cooperation among agencies (6, 23, 36, 37) or whether coordination is a more general concept which can include interaction among organizations that can be in competition or even in conflict with one another (4). This paper will assume coordination includes interaction among organizations who may be cooperating, in competition, or even in conflict with each other. In fact, in local communities, we find that at certain points in time, a given set of local organizations may be cooperating on one problem, competing on a second problem, and be in conflict on still a third issue. More research is needed to suggest how best to manage inter-agency competition and conflict at local levels in order to achieve community development goals.

Coordination: Authority versus No Authority

Many people first learn the meaning of coordination in an orientation program or training course teaching them how to be a successful manager or director of a department or division in a government agency or business. We all know that one of the key functions of a successful manager is to coordinate those roles (and people in those roles) over whom the manager has authority in the organization.

As we move from an *organizational context* to a *community context*, however, we find that the concept of coordination does not include the notion of a point of higher authority which can be turned to, to settle disagreements, arbitrate decisions, etc. Instead we usually find a very open system among community organizations. In most U.S. communities, there is usually no common point of authority over city councils, school boards, hospital boards, State and Federal agencies, and private voluntary and professional organizations, etc. If these diverse groups are to coordinate, it will be without a point of higher authority that we find within an organization. Research is needed to identify key principles of successful coordination in community settings where there is no point of higher authority. Researchers are also exploring other possible differences between traditional intraorganizational studies and the more recent interorganizational studies. Both conceptual (42) and measurement (28) differences are being investigated.

Coordination: Planning versus Operating Functions

To some, the term coordination (or coordinating committee, coordination council, coordinating organization) implies a *planning* function (13, 18). These writers do not imply an *operating* function, *i.e.*, providing goods and services to appropriate "clients." Operating functions are to be provided by individual organizations in a coordinated effort rather than by the coordinating organization. The recent establishment of aging coordinators throughout the U.S. assumes that the aging organization will be a focal point to plan for (coordinate) the needs of the aged in a given area, but existing public and private organizations would be the operating organizations to provide necessary services; such as churches providing meals for the elderly. Rogers (30) has focused on some key questions that should be raised when contemplating coordinating efforts for planning service delivery in rural areas.

Bigger Problems, Broader Solutions.—Many people have argued that our society's problems of the 1960's and the 1970's are quite different from the problems of 40–50 years ago. Problems of today (such as environmental concerns of air and water pollution, land use, meeting the needs of the aged, developing comprehensive health care, and developing energy programs) are more complex. If they are to be solved, new approaches are needed, including the involvement of more organizations and individuals.

Historically, the United States has established governmental (public) and volunteer (private) agencies to solve "categorical" problems. Problems were "narrowly" defined, such as tuberculosis, polio, soil conservation, and expanded highway nets. Agencies were created to solve each particular problem.

The complex problems of the 1960's and 1970's, however, have generated "comprehensive" solutions to problems. Thus we now have comprehensive planning by Departments of Transportation, Environmental Protection Agencies, etc. One aspect of Federal revenue sharing was to eliminate the "category" allocation of funding at the national level so that local communities could do comprehensive "general" community development at the local level.

One result of the new definition of problems was the need for many agencies (public and private) to be involved in the solution to the problem. This created a greater need for coordination among agencies as solutions were planned.

Another societal force for increased coordination has been the reluctance of taxpayers and legislators to provide funds for new operating agencies to solve society's problems. Instead legislators are arguing that existing operating agencies should work together (coordinate) to solve our new and bigger problems. For example, rather than fund a new operating agency to solve the problems of alcoholism, funds were provided for the planning and coordination of alcoholism efforts. Existing national, State, and local operational agencies were expected to provide the needed operational programs to help solve alcoholism problems. Thus special interest groups, emphasizing coordination of existing agencies to solve problems, have often been more favorably received than those special interest groups emphasizing the creation of new operating agencies to solve particular problems. Research is needed to compare and contrast the successes and failures of coordination efforts in different societal problem areas. Most research done to date focuses only on one problem area in one small geographical setting among a small group of organizations (5, 10, 12, 44). Most studies are also metropolitan based (3, 38).

The purpose of this section has been to introduce some of the different dimensions of the meaning of coordination. Researchers and others will need to continue their efforts to clearly define coordination at the conceptual level and to clearly explicate its semantic links to whatever empirical arena that is the focus of study.

A GENERAL RESEARCH FRAMEWORK FOR STUDYING COORDINATION

The purpose of this section is to present a general research framework for studying the process of coordination. (See Figure 1.) The general framework assumes that the social unit of action are organizations (not individuals) in an arena (some geographical community). The model also assumes that a focal field, or area of concern (a problem) can be specified, i.e., law enforcement, health, labor and manpower, aging, youth, low income, housing, energy, land use, water, etc. The definition of a focal field is critical in that it is one of the major criteria for delineating the organizations in a community which are most relevant to be coordinated in any given program effort.

Other assumptions are also generally made; i.e., individual organizations are faced with a situation of limited resources, organizations must obtain resources from other unit in their task environment, organizations prefer autonomy and engage in interaction only when resource needs cannot be met within the unit.

Impact

One needs to be concerned about "coordination for what." In other words, there needs to be specification of what impact or outcome is desired. (See box A in figure 1.)

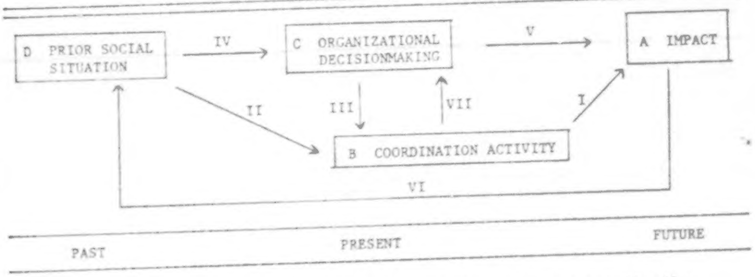

FIGURE 1.—A general research framework for studying coordination

One part of the impact question is, what is the social unit (or units) you want to impact? Most past researchers have focused primarily on individual changes. However, some programs are as, or more, concerned with changes in organizations, interorganizational relations, and communities. Most programs probably are concerned with impacting all four of these unit of analysis.

A second part of the impact question is, "what characteristics of the social unit do we want to change?" If individuals are our target unit, do we want to change attitudes, knowledge, or behavior? If organizations are the social unit we want to impact, do you want to change policy, planning procedures, resource allocation, establish new roles, or change orientation and training content, etc.?

Research is needed to more precisely identify the specific changes desired in the different social units. Perhaps the greatest need is to elaborate organizational (35) and community level impact objectives (15).

Coordination Activity

Once the desired impact is clearly specified, the focus shifts to the level (amount and kind) of coordination activity that is possible among organizations. (See box B in figure 1.)

One of the major research needs is to specify more clearly the kinds of coordination activities possible among organizations. Past research (17) has found that many organizations do not specify at an operational level what they mean by "coordination," "cooperation," "organizational interaction," "interaction activity," or "interorganizational relations." Many practitioners have indicated a frustration because they had been told to coordinate without having been told more precisely what to do in order to be coordinating.

In many cases, practitioners have indicated they have tried to coordinate but coordination hasn't worked. Upon more in-depth questioning, one finds that there has only been a low level of coordination interaction. Researchers (18, 19, 32) have thus tried to specify more precisely different levels of intensity of coordination activity. The following outline briefly summarizes some of the activities associated with three "levels" of coordination:

Low level coordination between organizations:

1. Acquaintance with relevant personnel from other organizations.
2. Familiarity with relevant programs of other organizations.
3. Informal unscheduled communications.
4. Exchange of general information: program emphasis, etc.
5. Joint interagency council membership.

Middle level coordination between organizations:

6. Formal exchange of information, in-house newsletter reports.
7. Exchange of personnel, resources, materials, and equipment.
8. Joint projects between organizations.

High level coordination between organizations:

9. Joint budgetary considerations and money exchange or transfer.
10. Formal overlapping boards.
11. Formal written agreements regarding organizations' policy and programs.

Research have found that in nonmetropolitan areas, the type of coordination activity among organizations differs significantly among types and hierarchically levels of organizations (18). Warren, *et al.* (40), found that public organizations coordinate more than private voluntary and professional groups. Rogers (33) found USDA agencies more committed to interagency coordination than private organizations. Klonglan, *et al.* (20) found when comparing different hierarchical levels of organizations that State level organizations coordinated far more than either district or county levels. County level organizations, however, coordinated more than district level organizations (district being at the level of multi-county economic planning and development areas within a State).

More research is needed to determine the different activity dimensions associated with the various levels of coordination activity.

Relationship Between Coordination and Impact

Most practitioners and researchers make the assumption that organizations working together (coordinating) will be more effective in meeting local needs (impact effectiveness) than each organization working independently of others on its own program. Having made this assumption, most researchers have made coordination the dependent variable and proceeded to seek variables that relate to or affect coordination.

Research studies that have focused on the relationship between differing levels of coordination among organizations (as the independent variable) and differing levels of impact (as the dependent variable) are very limited. Some studies (16, 25) have found a positive relationship between increased coordination and desired impact. Research is needed to better test this critical relationship. We need research that has better analytical design (longitudinal and comparative rather than cross sectional) and better measurement of both coordination intensity and impact (*i.e.*, communitywide impact *vs.* summing individual organizational impact [28]). More participant-observation studies are needed to enrich the more prevalent survey interview studies.

Factors Affecting Coordination Activity

As noted in the previous section most researchers studying interorganizational coordination have attempted to delineate those factors (boxes C and D figure 1) which will affect (positively or negatively) the level of coordination activity (B) among organizations.

Some research has focused on the effect (see line II) of the class of variables labelled "Prior Social Situation" (D) on coordination activity(B). Other researchers have focused on the class of variables labelled "Organizational Decisionmaking" (C) and their effect (see line III) on coordination (B). For a more detailed review of the general research findings related to this question, see Klonglan (17, 18). For a detailed research study of factors related to coordination among nonmetropolitan rural development organizations, see Roger's recent study (34).

Returning to the diagram, the prior social situation and organizational decisionmaking variables are those variables common to intra-organizational or general social system studies. For example, prior social situation variables include: (1) the organizational field or the organizations in the community relevant to the focal field of concern; (2) intra-organizational variables such as structure, functions, processes and orientation of organizational factors; (3) past interactions among the members of the organizational field; (4) the focal field initiating source, *i.e.*, was the program initiated by the local community (horizontal) or from the outside the community (vertical); (5) the environment in general; and (6) the task environment (knowledge and technology) directly relevant to the focal field of concern.

A distinction that may be useful at this point is the classification of past, present, and future (see bottom of figure 1). Impact is seen as a desired *future* state. Organizational decisionmaking and coordination activity can be seen as the *present* period, with the prior social situation being some *past* time period.

Thus, when we look at organizational decisionmaking, we are focusing on each of the organizations in the organizational field as it tries to decide whether or not to become involved (line III) in coordination activity. Four categories of factors can be specified as possibly affecting the organization's decision to interact (line III): orientation, structural, task, and processes. Using these criteria, the organization may decide to interact with other organizations (line III), or to act in the focal field independently of others (line V), or not to participate in this focal field at all. The prior social situation will affect (line IV) an organization's decision.

In a social systems framework, we further assume that over time, feedback occurs (line VI), *i.e.*, evaluations are made as to whether or not the impact (social progress) from coordination (or lack of coordination) is "good" or "bad." This feedback becomes part of the prior social situation for the next "round" of organizational decisionmaking and interaction activity. A very important part of the next round will be each organization's evaluation (line VII) of the coordination activity to date.

Research is needed to specify the most important factors that need to be taken into account in creating interorganizational coordination. More attention needs to be given to sorting out those factors which can be manipulated in the short run to increase coordination effectiveness, such as agency commitment to interagency coordination, from those factors which affect coordination but which cannot be manipulated in the short run, such as the number of public and private organizations in a given geographical area. Multi-variate, causal, and path models have just begun to be developed and tested (11, 24, 28, 29, 43) to ascertain the key variables affecting the degree of coordination activity.

The results of this research activity should help provide relevant information for practitioners involved in day-to-day coordination activities. The body of knowledge available to train agency and community coordinators is much more limited than the knowledge available to train agency staff to be a manager or director *within* an organization. In fact, most people in our society have been trained to be directors rather than coordinators. Universities and government agencies have many programs designed to train managers and directors. Schools of public administration, business administration, and industrial engineering, as well as sociologists, psychologists, and other social scientists have stressed the importance of how to operate as an effective manager or director *within an organization*. Traditional university and governmental agency training programs, however, have not emphasized the principles of how to establish interagency relations effectively and how to operate as an effective coordinator in a *community*. Only recently has there been the recognition of the need to add this new dimension of interagency relations and coordination to the training of local agency personnel. Health, welfare, youth, agricultural, and other agencies are just beginning to provide inservice training in interagency relations and coordination.

Applied research utilization efforts are just beginning (7, 8, 9, 17, 21, 26, 27, 41) to develop material in order to train organization and community leaders how to more effectively create interorganizational coordination. Klonglan, *et al*, (17, 21), have elaborated a 10-step planning model initially developed by Yep (22) for helping practitioners create interorganizational coordination. Each step can be seen as a barrier to effective coordination if not adequately resolved. Briefly, these steps are as follows:

Step 1. Problem—The first planning step deals with selecting and defining the problem and deciding if a coordination effort involving several organizations is necessary to solve the problem.

Step 2. Location—The second planning step focuses on the selection of the geographical area relevant to solving the problem.

Step 3. Key Organizations—In planning step 3 the key organizations needed to provide resources to help solve the problem should be specified. Organizations are "key" if they possess needed resources such as personnel, information, endorsements, materials, and agreements.

Step 4. Problem Commitment—Each organization must become committed to the problem before it will be willing to work with other organizations on the problem. An effective coordinator knows when and how to use strategies to convince an organization to reevaluate and change its priorities.

Step 5. Coordination Commitment—Organizations may be committed to the problem (step 4) but may not be committed to coordinate with other organizations in helping to solve the problem. A coordinator needs to know why organizations are or are not willing to coordinate. Also, the coordinator needs to be able to use strategies to develop coordination commitment.

Step 6. Consensus—If a high degree of consensus exists, all the key organizations want to work together. Sometimes one or more organizations want to "go it alone" or leave another organization out. Then, a coordinator may have to build consensus among organizations.

Step 7. Resource Flow—Resource flow refers to the flow or resources from individual organizations to the coordinated effort. In this coordination step, the resources *needed* from each organization for the coordinated effort are specified. Various resources, such as personnel, information, endorsements, materials, and agreements need to be considered.

Step 8. Coordination Structures—This planning step is used to get the key organizations to decide how they will relate to each other during the coordinated effort. Effective coordinators know when to use different kinds of coordination structures. Several kinds of coordination structures may be needed for a single project, *i.e.*, coordination may be a combination of authority, negotiation, and influence. The key criteria differentiating coordination structures include social power, formalization, and sanctions.

Step 9. Objectives—This planning step is used to get the key organizations to select the specific objectives for the coordinated effort. It is important to decide *how* the interorganizational objectives will be set. A good objective has three characteristics: (1) it is specific, (2) it is acceptable, and (3) it is possible.

Step 10. Plan of Work—This planning step is used to help the key organizations develop a comprehensive and acceptable plan of work for the coordinated effort.

After the planning is completed, it is time for action to begin. Action is concerned with the actual delivery of resources, meeting of deadlines, and fulfilling of responsibilities. It is necessary to monitor the action steps to make certain they occur as planned.

It is also necessary to be able to evaluate how specific target audience(s) (individuals, organizations, or communities) were impacted after the action program takes place.

Research is needed to determine whether or not individuals, organizations, and communities who receive this type of training will be able to have greater impact than those who do not receive such training.

SOME POLICY IMPLICATIONS

The coordination research completed to date suggests some preliminary policy implications. There is a need for Federal and State officials who request coordination among local organizations to be more precise as to what they expect local agencies to do when they "coordinate." Many organizations need to consider developing inservice training and orientation programs for their staff that will give them a more detailed understanding of the meaning of "coordination" as well as insights into its potentials and limitations in helping to achieve desirable social progress. Organizations and communities may need to consider changing their internal reward systems for professional staff if coordination is to be seen as a desirable activity, *i.e.*, reward interagency activity. Special efforts appear to be needed to educate public advisory bodies on their role in encouraging their agency staff to coordinate with other agencies and community groups. And evaluation models of organizational effectiveness (in this day of accountability) maybe need to include a major component assessing the "coordination effectiveness" of an organization.

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PART IV: DELIVERY

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REVIEW OF THE LITERATURE ON THE DEMAND FOR PUBLIC SERVICES

[By Robert T. Deacon*]

As recently as 1968, Julius Margolis could accurately state that "there is no body of studies of demand for urban public services" (71, p. 536). Since that time, however, there has been a rapid expansion of research activity in that area of inquiry. In part, the growing interest can be explained as a response to recent developments and refinements in the economic theory of public choice. Theories of rational voting—Anthony Downs (44)—median preference models of the political process—Howard R. Bowen (22), Duncan Black (18), and Downs (44)—and theories of jurisdictional choice—Charles M. Tiebout (107)—have all received considerable attention from theoretical researchers since the 1950s. Yet, while these models are rich in empirical implications, they were, until recently, subjected to only the most casual empirical scrutiny. In short, there is a body of potentially refutable implications in the public choice field, and analysis of demands for public services often forms a natural vehicle for investigation. Another likely reason for the rise in interest lies in the observed growth of the public sector, primarily at the State and local levels, during the postwar period. Together with this growth has come an increase in the number and complexity of new institutions and policy proposals in the realm of State and local finance. The public choice paradigm appears to offer the possibility of understanding and predicting the effects of such phenomena as matching or equalizing aid to State and local governments, voucher systems to finance public education, revenue sharing proposals, and unionization of public sector labor. Yet without corroborating empirical evidence, or estimates of the relative magnitudes of factors involved, it often fails as a useful guide to policy analysis.

DEMANDS FOR PUBLIC SERVICES

The notion of "demands for public services" is not without apparent ambiguities. Compare it, for example, to the rather well-defined concept of demands for private commodities. In the private sector, demand relationships trace the influence of prices, incomes, and observable preference characteristics upon the quantities and qualities of items purchased in markets. The paradigm employed to analyze these choices views patterns of consumption as the result of individual

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optimizing decisions, or at least well-informed, self-interested choices from clearly delineated sets of alternatives. In the public sector, it is obvious that consumption decisions are not reached individually in the context of impersonal markets; typically they are made collectively, and often articulated only indirectly by political representatives. For further elaboration, see Margolis (71, p. 536). To the extent that these collective choices reflect individual preferences or demands, the nature of the relationship depends directly upon the way in which variations in individually preferred outcomes and differential degrees of political power are aggregated into public policy, i.e., upon the nature of collective decisionmaking institutions.

At the heart of the problem of discerning individual subjective valuations of public services lie certain objective features of the commodities in question. For items such as police protection or flood control it is impossible, or at least costly, to exclude individuals from consuming once the goods are provided to some members of a community. Further, some commodities may be characterized by *jointness* or *non-rivalness* in consumption; in the polar case "each individual's consumption of such a good leads to no subtraction from any other individual's consumption"—P.A. Samuelson (98, p. 387). In the latter situation, exclusion of potential consumers is inefficient, in the Pareto sense, even if costless. In either case, failure of the exclusion principle to apply raises potential problems for the revelation of individual preferences. If citizens do not face the possibility of being excluded from consumption, any system of provision that relies on voluntary contributions (as in market exchange) is likely to fail since the amount of the goods available for an individual to consume is not significantly influenced by the magnitude of his contribution towards its provision. As Samuelson (98) forcefully pointed out, decentralized and voluntary arrangements cannot be relied upon to signal the valuations that individuals impute to public goods.

At the practical level, a natural way to approach the preference revelation problem is to adopt at the constitutional stage, rules regarding the way in which specific public proposals are chosen, and rules concerning the fashion in which costs of public goods are shared. As Bowen (22) noted—see also James M. Buchanan (29 Ch. 2, and 30 Ch. 5)—if each public spending proposal contains an implicit *quid pro quo* for the individual, the structure of which is not subject to choice at the specific policy stage, the incentive for individuals to conceal or misrepresent preferences is greatly reduced. If the value an individual attaches to a marginal unit of public output exceeds his implicit tax liability for it, the rational citizen will support the expansion of output by whatever means of influence are available. For those interested in individual valuations of public services, this naturally leads to the study of institutions and mechanisms through which citizens are able to influence public consumption levels.

The study of individual behavior in the context of collective decisionmaking situations is central to the emerging field of "public choice"—see surveys by Dennis C. Mueller (76) and Buchanan (31). The methodological framework of public choice is that of economics; the individual is the basic unit of analysis, and individual behavior is taken to be rational and self-interested—see Vincent Ostrom (84). The focus of analysis is upon collective decisionmaking institutions and the structure of individual incentives that these institutions imply.

Within the public choice field lies the study of demands for public goods, or the analysis of individual preference revelation in the collective decisionmaking process. The economic study of demands is characterized by its emphasis upon effective demands, or preferences revealed through voluntary behavior. This places it squarely in the mainstream of economic choice theory, and differentiates it from questionnaire surveys of preferences or attitudes toward public policies, and from estimation of benefits from public programs as computed in project evaluations.

As a matter of semantics, public commodities are distinguished from government marketed goods and services. The latter category includes items sold by governments directly to individuals at prices (*e.g.*, some public utilities). Since estimation of demands for such commodities is not conceptually different from demand estimation for private goods, analysis of these items is not emphasized in this review. Rather, attention is drawn to goods and services for which individual consumption levels are collectively determined within a given jurisdiction.

Demand Estimation: An Overview of Public Choice Approaches

Major efforts toward empirical analysis of the public economy have been under way since the late 1940s. Only in the last decade, however, has the focus of research been drawn toward formulating and testing models based upon behavioral or public choice theories, and toward estimation of demands *per se*. Currently, the most widely used approach utilizes data on expenditure patterns for various types of public services. A second approach to demand estimation looks directly at the electoral process and studies voting behavior on public finance issues. Another method that is beginning to emerge studies household locational choices and valuations of public services as reflected in property markets.

Each of these approaches confronts a variety of practical difficulties. Because the commodities in question are typically services (*e.g.*, public protection, education, health care) it is often difficult to observe, or even specify conceptually, measurable units of output. As a direct consequence, observations on the *quid pro quo*, or implicit price per unit are equally difficult to obtain. This apparent problem has resulted in a great deal of effort directed toward measuring public services. As a practical matter, however, the choice of units in which to specify output is arbitrary and under fairly weak assumptions on production technologies, no generality is lost by specifying units in such a fashion that minimized costs are constant—see Theodore C. Bergstrom and Robert P. Goodman (16, p. 280). Although there are exceptions, most studies have adopted the assumption that costs per unit output are constant in a given political unit so that per capita output is proportional to per capita expenditure.

Another practical consideration arises from the fact that public services are generally provided to citizens by a federated system of governments. For example, the typical citizen receives public protection services from city, county, and State governments. Thus behavior with regard to the collective choice process at one level of government is dependent upon existing policies at other levels of government. This is problematic because the intergovernmental allocation of responsibility for provision of services (*e.g.*, county *versus* municipal provision) often varies across State boundaries. Approaches taken to these and other potential problems are discussed in the context of individual studies outlined below.

PUBLIC EXPENDITURE MODELS

Harold Hotelling (65) was perhaps the first economist to present an economic description of the political process under majority rule. He viewed political opinion as being evenly distributed along a single dimension (*e.g.* liberal-conservative) and assumed that each voter casts a ballot for that candidate who most closely approximates his preferred position on the spectrum. In the context of a two candidate election decided by simple majority rule, vote maximizing politicians are led to choose platforms at the center of the political spectrum.

This line of inquiry was extended by Bowen (22) to collective decisions on public spending issues. Preferences for alternative levels of public output were cast in terms of individual marginal valuations or shadow demands. Each individual's share of the cost of public provision was assumed to be predetermined to that the basic problem of preference revelation was circumvented. This also guaranteed that individuals' preferred levels of output occur where marginal valuation and tax price (tax liability for a marginal unit) are equal. If successive ballot issues offer incremental increases in outlays for a single public good and if all citizens vote, then the final outcome is at the median of individually preferred levels of output. In effect, the equilibrium level of public spending in a jurisdiction exactly satisfies the public service demand of the median voter (or median class of voters). Thus within the admittedly rigid precepts of the model, a correspondence between spending levels and effective demands for a class of the citizenry is established.

The analysis of majority rule outcomes was generalized considerably by Black (18)—see also K. J. Arrow, (4)—who showed that if political issues are such that a sequencing of the alternative proposals can be found along which individual preferences are single peaked, then a dominant position exists at the median of individually preferred outcomes. The median dominates in the sense that if all eligible citizens vote in their self-interest, then no single alternative proposal can beat the median position under majority rule. Further extensions of the median voter paradigm have been provided by Downs (44) and by Buchanan and Tullock (32) who were largely concerned with majority voting in the context of representative democracy. Among other topics, their analysis considered problems of variable voter participation and logrolling in situations where issues to be decided are inherently multi-dimensional.

Despite the apparent severity of the assumptions employed in the median voter public choice model, it does provide a potential vehicle for analyzing collective consumption patterns in terms of individual demands. Although several public choice theorists have put forth complex and often times descriptive models of the political process—see Jerome Rothenberg (94), Albert Breton (25) and (26), and William A. Niskannen (78) and (79)—most demand-oriented public expenditure studies have adopted a variant of the median voter approach.

Expenditure Determinant Studies

Until recently the implications of public choice theory for empirical analysis of Government expenditures were not recognized. In the postwar period, a wealth of data on Government spending in the United States became available and one of the first researchers to exploit it was Solomon Fabricant (48). Using his now famous three variables, per capita income, urbanization, and population density, Fabricant was able to "explain" a substantial portion of the variance in per capita expenditure on local government services. This initial success and advances in computing technology induced a multitude of very similar regression studies. Most notable are those of Harvey E. Brazer (24), Glenn W. Fisher (50), R. F. Adams (1), Seymour Sacks and Robert Harris (97), and Alan K. Campbell and Seymour Sacks (34). Beyond the addition of new explanatory variables such as intergovernmental revenue and socio-economic characteristics of populations, and analysis of more recent data, these studies offered little methodological advance over Fabricant's original research.

The literature on determinants of public expenditures has been surveyed by several authors—see Elliott R. Morss (75), Edward M. Gramlich (55), Barry N. Seigel (100), and Arthur T. Denzau (42)—and the commentators are virtually unanimous in their criticism. The most frequently expressed complaints is the *ad hoc* nature of the empirical models estimated. Although expenditure determinant equations may be relatively successful in explaining cross-sectional variations in per capita public spending, that is literally all they are capable of doing. Without explicit theoretical underpinnings, they present no opportunity to test or refute behavioral hypotheses.[1]

Majority Rule—Median Voter Models

The first researcher to recognize the implications of emerging economic theories of majority rule for analysis of public expenditure patterns was Otto A. Davis (38). His approach was loosely based upon the voting models of Downs (44) and Buchanan and Tullock (32) in which political candidates vie for office by offering expenditure proposals or platforms to the electorate. Voters, motivated by self-interest, cast ballots for those platforms that most closely approximate (in a utility sense) their individual demands for public outlays. Hence, Davis concentrated upon those factors that were expected, *a priori*, to influence citizen demands. Primary emphasis was placed upon the price effect the notion that each voter will desire more of a public service the lower is his share of the total tax bill. In particular, it was postulated that educational expenditures per student are positively related to the size of the industrial tax base (if the burden of taxes on industrial property falls largely on outsiders) and negatively related to the percent of the electorate owning property. These hypotheses were teated in a regression study of cross section data and results obtained were generally significant and in accord with prior expectations. Essentially the same technique was used by Davis and Haines (39) in their study of municipal expenditure patterns for a variety of local public services.

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[1] The argument is similar to that leveled by R. G. Lipsey at the literature on the Phillips curve: "If the relationship ceases to hold, or changes, and we have no model to explain it, we can only say 'the relationship ceased to hold' or 'the relationship changed' and we learn nothing more than this. If we have a model explaining the relationship, we will know the conditions under which the relationship is expected to remain unchanged" (74, p. 409).

This approach was formalized considerably by James L. Barr and Otto A. Davis (10). By including taxes in the consumer's budget constraint and public services in the utility function, they were able to characterize preferred levels of output more precisely.[2] As with the two previous studies, however, empirical analysis was confined to examination of qualitative hypotheses from the model, primarily the direction of the price effect. While all three studies were exploratory in nature and presented only suggestive results, they represent an important departure from the literature on expenditure determinants that largely ignored the role of individual preferences and the political nature of the choice process.

The first attempt to specifically estimate demand parameters for public goods was undertaken by Robin Barlow (9). Though the primary questions addressed were normative, his investigation required price and income elasticities for public education.[3] Following Barr and Davis (10), he assumed that actual spending levels reflect median demands and specified the form of the median demand function as log-linear in median tax price and income in each jurisdiction.[4] Quantity consumed was measured by expenditure per pupil. Application of the model to cross section data yielded point estimates for price and income elasticity of 0.34 and 0.64 respectively, and both estimates were highly significant. Although Barlow's analysis was the subject of some debate in the literature—see Yoram Barzel (12), Bergstrom (15) and N. M. Edelson (46)—the questions raised largely concerned details of his study rather than the general method of approach.

To this point, attention had not been directed toward those features of goods that make them candidates for collective provision. In particular, the concept of joint consumption economies and its implications for demands had not been incorporated in estimation. This aspect of public sector demands was highlighted in papers by Thomas E. Borcherding and Robert T. Deacon (20) and by Bergstrom and Goodman (16), both of which allowed for degrees of non-rivalness in consumption.[5] The introduction of possible joint consumption economies alters the notion of tax price in a fundamental way. If, for example, a good exhibits complete non-rivalness in consumption, the per capita cost of providing one unit of consumption to each member in a jurisdiction is inversely proportional to the size of the population served.[6]

The conceptual approach in both papers is highly similar and the only substantial divergence regards empirical specification of the tax price term. Both studies applied ordinary least squares regression analysis to cross section data on Government spending for a variety of public services. Since the data used were for different years and at differing levels of aggregation, it is not surprising that their results differed somewhat, although price and income elasticities were generally of anticipated sign. One result that was remarkably consistent in the two studies, however, concerns the degree of rivalness in consumption. Under the specifications used, none of the services examined exhibited significant joint consumption economies [7]—see also Werner Pommerehne and Bruno S. Frey (90) and Charles T. Clotfelter (35) for similar results.

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[2] Barr and Davis also showed that under property tax finance, the individual's tax price is proportional to his share of the jurisdiction's assessed value. Further, they developed a set of sufficient conditions under which preferences are single peaked in situations where output levels for several public services are to be decided in a single election.

[3] The use of information on income and price elasticities of demand to characterize the identity of the median voter, as employed by Barlow (9), was first suggested in an article by Buchanan (28). In fact, Buchanan's analysis of the public choice consequences of alterations in tax progression is implicit in much of the recent work on demand-oriented expenditure models.

[4] Barlow assumed that tax prices are proportional to the fraction of taxable property in a jurisdiction that is nonindustrial. This implicitly assumes that financing is by a property tax, outsiders bear the burden of industrial property taxes, and the median share of the nonindustrial tax burden is identical, in all jurisdictions.

[5] Both specified a "consumption technology" of the form $q = xn^{-a}$ where q is the quantity that enters individual utilities, x is a measure of the physical amount produced and n is the number of persons sharing in consumption. The parameter a is specific to a particular good and measures the degree to which joint consumption economies exist; if $a = o$ such economies are complete, while $a = 1$ implies an absence of joint consumption economies.

[6] Bergstrom and Goodman developed a very useful theorem which, in the context of log linear demand functions, and under certain assumptions on income distributions, provides a specification for the form of the median demand function in a jurisdiction.

The median voter approach, particularly as specified above, has been employed by a number of other researchers. Deacon (40) extended the general approach to a system of demand equations for six public services and used disaggregated time series data in estimation. The primary aim of this study was to examine substitution effects in consumption and to test various hypotheses implied by the theory. Helen F. Ladd (67) adopted the majority rule paradigm to analyze local government response to intergovernmental transfers and to specify a measure of fiscal capacity. An interesting comparison of expenditure determinants *versus* public choice approaches to analysis of Government spending is provided by Pommerehne and Frey (90). For application to demands for public education, see George M. Peterson (86), Coltfelter (35), and Helen F. Ladd (67). A measure of agreement appears to be emerging from this literature regarding the general shape of demand functions. In most cases, demands appear to be price inelastic. Estimated income elasticities are generally positive and less than unity (though there are notable exceptions, such as parts and recreation, which typically exhibit income elasticities above unity).

Although this field has undergone rapid development in the recent past, it would appear that much remains to be done. In most studies, the analysis of revenue structures and resulting distributions of marginal tax prices in the populace is given only cursory consideration—see B. W. Brown and D. H. Saks (27). Further, such institutional considerations as the allocation of public supply responsibilities to various levels of government are seldom studies in detail. Attention to these and other considerations discussed below may help to resolve or explain some of the differences in results reported from different studies.

Alternative Approaches

Although most recent research on expenditure-based demand models appears to be adopting the median voter paradigm, a number of other recent works have developed non-political though demand-oriented expenditure models. The general hypothesis that local governments act as if maximizing a utility or welfare function (with categories of public and private expenditure as arguments), subject to a budget constraint, has been employed to study the effect of intergovernmental revenue upon State and local spending—see James M. Henderson (62) and W. J. Scanlon and R. P. Strauss (99). Gramlich (54) and Gramlich and Galper (56) used essentially the same framework to study income and substitution effects of various types of aid programs to State and local governments. Utility or welfare maximization is also implicit in Burton A. Weisbrod's (111) analysis of student migration and expenditures on higher education and in Martin S. Feldstein's (49) study of aid programs to public education.

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[7] By itself, this finding does not necessarily carry normative implications regarding how such services should be provided (*e.g.*, privately versus collectively). Non-exclusion may remain a problem in even the absence of joint consumption economies (Borcherding and Deacon, 20, p. 900). Further, reported results may merely reflect the exhaustion of such economies at the margin, *i.e.*, for the addition of an extra consumer to the sharing group (Bergstrom and Goodman, 16, p. 293–4). One area where these results do have potentially important implications is in the theory of optimal jurisdictional size (Wallace E. Oates, 81, ch. 5, and Yorman Barzel, 11).

Other nonpolitical models have been more specifically interested in estimating demands. John C. Hambor, *et al.* (58) derived a demand function for public education from the welfare maximization hypothesis and estimated it, simultaneously, with a supply function.[8] James C. Ohls and Terence J. Wales (82) adopted a simple supply-demand approach without an underlying objective function or behavioral model to analyze public spending on State and local services. A number of economic and demographic variables were postulated to exert either supply or demand side influences.

Unlike other demand models outlined in this review, the above approaches are not based upon an explicit view of the choice process. Since choice mechanisms are the central concern here, these studies have been given an admittedly cursory review.

Comments

Among the various techniques used to study demands for public services, the median voter model is unique in that it attempts to specify a theory of political outcomes. In practice, of course, it has been necessary to adopt a rather simple view of complex political phenomena, and the apparent lack of realism in the majority rule models used has been a source of criticism. The underlying assumption that communities attain a Bowen equilibrium, so that patterns of community resource allocation behave as if they are generated by a single consistent set of preferences, is certainly very convenient for empirical work. Yet the supposition that majority rule leads to exact satisfaction of the median preference has gone largely untested—see, however, an interesting study by Randall G. Holcombe (64).

Despite the seemingly stratospheric level of abstraction, however, the attempt to model political outcomes appears important. Such attempts force the analyst to consider collective choice institutions explicitly and the pattern of incentives they imply. This has, for example, led to the study of tax structures (e.g., the composition of the property tax base) and the way in which they influence expenditure levels, and to the analysis of how perceived tax burdens are distributed in the population. On balance, the median voter paradigm appears better characterized as a framework for studying observed public expenditure outcomes rather than a vehicle for estimating individual demand functions *per se*.

The attempt to model demands in terms of a public choice model often gives rise to analysis of ancillary questions. Indeed, many of the more interesting applications of the median voter approach have been concerned with investigation of general public choice hypotheses rather than demand estimation. For example, Clotfelter (35) used the median demand framework to study the effects of complexity in tax institutions and possible fiscal illusion upon public spending—see also Richard E. Wagner (109). Other applications have concerned the examination of hypotheses derived from theories of bureaucratic behavior—Borcherding, *et al.* (21) and Wagner and Weber (110)—and the effects of equalization aid programs for public education—Ladd (67) and Susan J. Lepper (68). The variety of uses to which the median voter paradigm has been applied illustrates one of its advantages, a flexibility for studying diverse public choice hypotheses.

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[8] Although this study is similar in spirit to other expenditure studies, it is somewhat out of place in this section since expenditure was not used as a proxy for output.

ANALYSIS OF VOTING BEHAVIOR

The notion that individuals act in self-interest when choosing among ballot alternatives has been implicit in public choice theory from its beginning—Bowen (22) and Downs (44, pp. 27–28, 38–45). Extension of the utility maximization choice paradigm from the realm of the market to the voting booth has apparently been so natural that it is axiomatic in the theoretical literature. The view that individuals compare ballot alternatives and vote for those that offer preferred outcomes immediately suggests the use of voting data as information on revealed preferences for public goods.

In fact, the act of casting a vote for a particular alternative is the result of a number of decisions. Prior to this specific choice, the individual must decide whether or not to invest the time and resources needed to become sufficiently informed on the issues to reach rational decision. Further the act of voting usually involves costs that are significant, certainly in comparison to the likely benefit they will bestow upon the individual voter—for further discussion of these points, see Downs (44, pp. 207–278). The nature of voting costs and the phenomenon of rational abstention are clearly amenable to economic analysis and have been studied by theoretical and empirical researchers (as discussed below). The existence of voting costs does not, however, modify the conceptual notion that ballot choices provide information on the preferences of those who actually vote.

Under the assumption of self-interest, ballot choices represent data on revealed preferences only in the absence of vote trading or "logrolling." In most discussions of this phenomenon, it is noted that logrolling may take place explicitly or implicitly—see Buchanan and Tullock (32, pp. 132–45, 270–2). Implicit logrolling would be reflected by a political platform or multidimensional ballot issue that represents a coalition of intensely held minority positions. Such implicit vote trading presents no conceptual problem for the voting behavior approach, though the nature of ballot choices are generally complex in such situations. Direct or explicit vote trading would present a conceptual problem—Downs, (44, pp. 176–7), though it is unlikely to occur in situations where collective choices are reached in direct elections rather than voting by representatives. With direct referenda the costs of arranging trades across issues are likely to be large relative to the potential gain, and the secret ballot makes enforcement of agreements an obvious difficulty.

Another potential theoretical problem in the voting behavior approach surrounds the possibility of strategic voting. It may be in a citizen's self-interest to vote against the preferred alternative on a particular ballot, if he believes its defeat will bring forth an even more favorable ballot issue in a future election. At present, little is known of the empirical importance of this phenomenon.

Empirical Studies of Voting

Until the mid 1960s, analysis of election results was largely the domain of political scientists and sociologists. For a brief description of major voting studies and a bibliography of references, see Richard G. Niemi and Herbert F. Weisberg (77 pp. 7–17). A primary concern in this literature is the study of such factors as party affiliation and ideology as determinants of voting behavior. One of the first empirical studies to stress economic aspects of voting choices was conducted by James Q. Wilson and Edward C. Banfield (113). Their aim was simply to test the hypothesis that self-interest, narrowly conceived, could successfully explain voting behavior on municipal public finance referenda in Cleveland and Chicago. Although the specification of self-interest in their model was often rather imprecise, they did obtain several highly suggestive results. Among these was a rather sharp dichotomy in observed behavior between property owners and renters on property tax financed issues (113, p. 75–92), a distinction that predictably disappeared where other financing arrangements were used. However, several seemingly anomalous results (such as high income voters favoring welfare services) were observed, and Wilson and Banfield were led to introduce the notion of "public regardingness" as an attribute of certain classes of voters that induces them to vote against their self-interest.

It is at least plausible that the anomalies were more apparent than real and due to an overly narrow interpretation of self-interest; in places Wilson and Banfield seem to equate this with enhancement of money income rather than utility. Regardless, a number of ensuing studies—see Lewis Bowman, *et al.* (23), Mickey Levy (69), and Jeffrey W. Smith (105)—were devoted to examination of "public regardingness" versus self-interest or "rationality" as determinants of voting behavior. Much of the evidence advanced in support of the public regardingness view appears vague at best. This is not necessarily because the notion itself is untrue, but rather because it is exceedingly difficult to specify what constitutes public regarding behavior in specific instances. Presumably it is the individual's conception of "the public interest," but this makes it difficult to formulate propositions based upon public regardingness that are potentially refutable. As an illustration, Bowman, *et al.* (23) in their study of a rapid transit initiative, were led to assume that adoption of the proposal under study was in the public interest. On balance, existing evidence in support of the self-interest view—see studies cited above as well as Richard L. Lucier (70)—has been sufficiently convincing to most recent researchers to induce them to adopt it as axiomatic.

Among the first to explicitly propose the use of voting data to study demands for public goods was William C. Birdsall (17). At the aggregate level, Birdsall utilized the percent of voters in a jurisdiction favoring a particular referendum as a measure of intensity of preference for the services involved, and related preferences to an almost exhaustive set of socioeconomic characteristics of populations. In this fashion, socioeconomic measures were used to explain aggregate voting returns on 26 bond finance referenda in New York State.

A number of conceptual issues were largely ignored in the exploratory studies of Birdsall (17) and Wilson and Banfield (113), and for this reason it is not surprising that the results obtained often appeared inconclusive. The individual choice problem was not fully developed in either study. Without a unifying model to guide the selection of explanatory variables or to aid in formulation of *a priori* hypotheses, empirical specifications were often *ad hoc*. Further, theoretical issues surrounding the interpretation of aggregate voting responses were not addressed. Both areas of omission were the subject of study by subsequent researchers.

Recently, the voting behavior approach has been intensively applied to study demands for local public education—for a survey of early studies of school finance referenda, see Arthur J. Alexander and Gail V. Bass (2, pp. 8–18). Education appears an ideal vehicle for this technique, since in most communities, local officials must secure direct voter approval in order to raise spending levels or incur additional debt. Since the local school district is essentially a single-purpose government with a relatively simple revenue structure, tax levy referenda closely approximate choices between alternative levels of output for a single public good.

Exemplary of the voting behavior approach to study of demands for education is George M. Peterson's (86) analysis of school tax referenda in Michigan. Individual utility maximization subject to a budget constraint that included tax liabilities was used to specify individual demands for education as a function of tax price (the individual's implicit tax liability per dollar of public spending), State aid payments for education, and the number of children per household.[9] As Peterson noted, if one had prior information on demand functions and proposed expenditure changes were marginal, individual voting responses could be predicted. Likewise, "the demand function (for public education) ought to be the most effective discriminant function for distinguishing 'yes' from 'no' votes that households cast" (*86*, p. 104). Using this approach, demand functions for local education were estimated from data on household voting responses. Both price and income effects were highly significant and of expected sign. However, as Peterson points out, results from a single election are sufficient only to estimate relative magnitudes of demand parameters. This is essentially due to the fact that a single election yields only one potential observation on quantity demanded.[10] Interestingly, analysis of precinct results revealed a rather sharp divergence in voting patterns between property owners and renters that were other-

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[9] Note the similarity to the approach taken in Barr and Davis (10) and other expenditure studies.

[10] Intuitively, this may be demonstrated as follows. Suppose that the form of the demand function is linear so that

$$q=a_0-a_1t+a_2y \qquad (1)$$

where q is quantity, t is tax price, and y is income. If $\overline{q}$ is the quantity available then voting analysis on marginal changes offers the possibility of discerning classes of voters (i) for whom $\overline{q}$ is the quantity demanded, *i.e.*,

$$\overline{q}=a_0-a_1t_i+a_2y_i; \qquad (2)$$

where t_i and y_i are such that

$$d\overline{q}=a_1dt_i+a_2dy_i=0. \qquad (3)$$

However, the latter relationship between t_i and y_i is also consistent with a linear transformation of the demand function in (1).

wise similar. As in a number of expenditure studies, these results suggested that renters perceive themselves as bearing only a portion of the tax liability on rental property.

Others who have used the voting behavior approach to analyze demands for public education include Daniel L. Rubinfeld (95), J. L. Mikesell and J. P. Blair (74), Anthony J. Barkume (8) and Eric A. Hanushek (59). Following Peterson's basic approach, Rubinfeld studied disaggregated household voting data and obtained significant price and income effects that were of expected sign. Further, the direction and significance of these effects appeared robust when different techniques were used to represent price and income terms. Rubinfeld also found that household demands for education initially rise with the number of children per household, but level off or decline for values above three.

Problems posed by the use of aggregate voting responses (*e.g.*, precinct voting data) and the effect of numbers of school age children upon demands was education were highlighted in Barkume's (8) study of a local school tax referendum in California. The use of aggregate voting returns was approached by assuming the distribution of individual demands for educational spending in a jurisdiction to be logistic in form. The mean quantity demanded was specified to equal the demand function for education evaluated at mean values of tax price, income, etc., in a precinct. Logit regressions were then used to estimate the relative magnitude of price and income effects in the demand function.[11]

Public referenda are often more complex than the typical school levy election in that they propose changes in several parameters that affect individual utilities and not merely an alteration in the financing level for a single public service. As Rene L. Frey and Leopold Kohn (53) point out, some changes implied by a referendum may only be implicit, *e.g.*, a proposed increase in one service offered by a multipurpose government, with no corresponding tax change, implies reductions in other services provided by the jurisdiction. Further, some proposed policies may exact a *quid pro quo* from citizens by influencing market prices and incomes, rather than through direct taxation. In such cases, careful scrutiny of ballot alternatives is necessary for the specification of voting choices. Although such issues may be complex and difficult to model, the view that voting provides information on revealed preferences implies that shadow demands can still, in principle, be estimated.

Multidimensional ballot issues have been studied by Perry Shapiro (101), Barkume (7), and Deacon and Shapiro (41). An issue studied in the latter work involved legislation to protect scenic coastal resources in California at the expense of property values for certain assets, and incomes in various occupational categories. The framework used to analyze the complex voting choices involved was a mixed indirect utility function. If individuals allocate disposable income in a utility maximizing fashion it is possible to express utility under alternative ballot outcomes as a function of prices, disposable incomes, and consumption levels for public goods.[12] The self-interest postulate then implies that voters cast ballots for alternative offering highest utility. Also studied was the phenomenon of "abstention at the polls" (failure of a person at the polls to cast a ballot on a particular issue) which was assumed to result from an inability to perceive differences in potential utility under alternative outcomes. Conditional logit analysis was used to analyze voting returns and the direction of results obtained were generally in accord with prior expectations. Although no attempt was made to specifically estimate demand functions, the approach taken appears well suited for the study of marginal valuations in the context of multidimensional issues.

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[11] This approach to the analysis of aggregate data was also used by Perry Shapiro (101) and by Deacon and Shapiro (41). Barkume also postulated that numbers of children per household may influence demands in two ways. The household demand for education was specified to be a function of the number of children, and the household's tax price per child was inversely proportional to the number of children per household. In estimation, the first effect tended to reduce the level of education demanded, but the latter predictably increased it. On balance the two forces were approximately offsetting (contrary to the findings of Rubinfeld (95) and Peterson (86)).

Comments

An attractive feature of the voting behavior approach is the apparent simplicity and plausibility of its assumptions. Unlike the median voter expenditure approach, it does not attempt to completely model political outcomes; thus some of the more tenuous assumptions of that paradigm are unnecessary. Even though actual political outcomes reflect a variety of political forces, and are just the result of direct majority rule on all issues, the simple notion that individual preferences are revealed in ballot choices is not contradicted.

While the studies summarized above dealt almost exclusively with choice among ballot alternatives, several other researchers have concentrated upon "turnout," the decision of whether or not to cast a ballot at all—see Yoram Barzel and Eugene Silberberg (13), Robert Tollison, *et al.* (108), and Morris Silver (102). Both types of choices were integrated in Eric Hanushek's (59) study of two municipal referenda in Cleveland. As he notes, the fact that only a fraction of the eligible voting population shows up at the polls has important practical consequences for voting demand studies, particularly where aggregate responses are observed. If the persons who actually cast ballots are not a representative sample of the population at large, as Morris Silver (102) suggests, the use of socioeconomic data on populations to analyze voting patterns is inappropriate. Aside from the use of totally disaggregated data (discussed below) one way to approach this problem would be to model and analyze the decision to turn out simultaneously with ballot choice—Barkume (6). In general, the potential difficulties raised by abstention appear less severe when a number of issues are on the ballot, since in such cases it is less likely that the nature of a specific proposal under study exerts a significant influence upon the class of citizens that shows up at the polls.

The above consideration is a member of a more general class of aggregation problems. Typically, only the voting responses of groups of individuals are observed (*e.g.*, precinct returns). At present, little is known about the magnitude of biases that may be introduced when aggregate responses are studied. Comparison of results from group responses with those obtained from totally disaggregated data—as used, for example, by Peterson (86) and Rubinfeld (95)—may be useful in this regard.

One feature that limits the applicability of the voting behavior approach to demand estimation is the simple fact that it requires direct referenda on public service provision. Further, with the possible exception of school tax referenda, ballot issues often contain peculiar features which make each one unique. Hence, one must give detailed attention to the specific provisions of an issue and the nature of the choice involved, *i.e.*, it is often necessary to model, in detail, each ballot issue studied. In addition, voting results for a single ballot issue cannot generally provide information upon absolute magnitudes of demand parameters; only relative magnitudes can be estimated. In principle, it is possible to estimate absolute magnitudes only if one studies results from two or more referenda that involved different levels of public provision. Despite these considerations, however, data on ballot choices remain a rich source of direct information on revealed choices.

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[12] The use of mixed indirect utility functions to describe voters preferences was independently suggested by Steven Slutsky (103).

Public Service Demands and Property Markets

In 1956 Tiebout (107) made the observation that households, when choosing a community in which to reside, effectively have the opportunity to shop among a range of alternative public service consumption bundles and associated tax liabilities. Initially, the phenomenon of "voting with one's feet" was offered in response to Samuelson's (98) claim that no decentralized market-like mechanism exists to signal preferences and guide resource allocation in the public sector. Much of the discussion of Tiebout's model has focused upon its implications for efficiency in public sector consumption, but these questions are not really central to the topic of this survey. More relevant is the point, offered by Margolis (71, p. 550), that perceived benefits from public service consumption will be reflected in real property values. Hence, by studying relationships between property values and public service levels, it may be possible to draw inferences on valuations of public consumption.

The key to the property value approach lies in the view that dwelling units (land and improvements) embody a variety of site-specific attributes. Each housing unit is characterized not only by the housing services it offers, but also by a bundle of implicitly transferrable,[13] though nontransportable, consumption items such as public services, environmental or neighborhood amenities, and access to market centers. The distribution of income and preferences in an urban area gives rise to demands for housing and site attributes, and hence to demands for housing units at specific sites. In equilibrium, prices of housing at various locations equate supplies and demands for housing services and for site specific attributes such as public services. The result is a hedonic property value function, a relationship between housing attributes and property values.[14]

By itself, a hedonic property value function does not generally yield unambiguous information on preferences for site attributes, since it is a product of both supply and demand conditions—see Steven A. Cobb (36). Suppose, however, that consumers achieve locational equilibrium by choosing residences in a utility maximizing fashion, and that the supply of sites with varying attributes is sufficiently diverse that specific attributes may be chosen in a continuous fashion. Then each consumer's marginal valuation for a given attribute will, in equilibrium, equal the implicit marginal price of that attribute in the housing value functions[15]—see Kenneth A. Small (104) and Sherwin Rosen (93). From this, it follows that observations on individual marginal valuations and quantities consumed for various public services may be used to estimate marginal valuations or demand, functions.

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[13] The commodities are implicitly transferrable through transactions in the property market.

[14] For a general discussion of hedonic price functions, see Sherwin Rosen (93).

Although several studies have investigated relationships between property values and public services, these efforts have largely pursued goals other than demand estimation. Paralleling the public services-property value literature is a rather well-developed set of related studies on property values and environmental amenities. Since the latter body of literature has been directly concerned with demand estimation, it is discussed below.

Some Suggestive Empirical Results

Early work on property value-public services relationships was primarily concerned with the capitalization of property taxes. R. Stafford Smith (106) studied the effect of differential property tax changes in San Francisco that were unaccompanied by changes in service levels. Analyzing cross section observations on property values in different time periods, he found substantial tax capitalization in the long run. Larry L. Orr (83) examined capitalization of differential local property tax rates in a cross section of urban communities. Although his conceptual model and empirical methodology were criticized—see J. D. Heinberg and Wallace E. Oates (61) and Robert M. Coen and Brian J. Powell (37)—Orr's study is notable in that it attempted to take into account differences in public service levels (local education) and their effect upon property values.

Subsequent empirical studies have been primarily concerned with the implication of Tiebout equilibrium for property values. In one such study, Oates (80) estimated a regression equation that related individual house values to local tax rates, public service levels, measures of neighborhood amenities, and location. The level of public services was originally measured by public education expenditure per pupil, but was later extended to include municipal service expenditures as well. In what was essentially as estimated hedonic price function, Oates found that *ceteris paribus*, high tax rates are associated with low property values, while increased public service levels are reflected in higher property values. Both effects were statistically significant and, of course, of anticipated direction. In general, these findings merely support the intuitively plausible notion that households take public services into account when making locational decisions.

A number of other studies have followed Oates in attempting to estimate hedonic property value regressions—see Henry O. Pollakowski (89), Howard S. Bloom, *et al.* (19), David Hyman and E. C. Pasour (66), and Richard G. Gustely (57)—and most have corrobo-

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[15] If h is housing services, q is the consumption level of a single public good, and r is rent, then a hedonic price function in this simple case may be expressed

$$r = r(h, q)$$

Using x to denote a generalized consumption good with unit price, locational equilibrium for a household implies

$$MRS_{qx} = \partial r / \partial q$$

where the left hand side is the marginal rate of substitution of q for x, or the consumer's marginal valuation of the public good q.

rated the positive influence of public services and the negative influence of taxes upon property values. Virtually all of these have, however, been attempts to shed empirical light upon the efficacy of the Tiebout mechanism [16]—in particular, Matthew Edel and Elliott Sclar (45) and George R. Meadows (73). None has specifically attempted to use the property value approach to estimate public service demands.

In closely related literature, the hedonic regression technique has been used to investigate the benefits from reducing air pollution—this literature is ably surveyed by Rubinfeld (96). Representative of of these attempts are works by R. G. Ridker and J. A. Henning (91) and R. J. Anderson and T. D. Crocker (3). Since the aim of these studies was measurement of consumer valuations, or willingness to pay, for improved air quality, they have generally been demand-oriented. Further, the level of analysis, particularly with regard to specification of locational models and interpretation of results, appears more sophisticated than in the public services literature—especially A. Mitchell Polinsky and Daniel L. Rubinfeld (88), A. Myrick Freeman (51) and Small (104).

The current state of the art, in terms of estimating demands for nonmarket commodities with property market data is represented by David Harrison and D. L. Rubinfeld (60). Using the approach outlined earlier—suggested originally by Rosen (93) and Freeman (51)—they estimated marginal valuation functions for air pollution control in the Boston area. Results obtained include price and income elasticities of demand [17] for air quality. Given the existence of a rather well-developed paradigm, together with the encouraging results of Harrison and Rubinfeld, application of this technique to public service demand analysis may prove rewarding.

Comments

At present, the property market approach to estimating demands for public services appears a promising, though untried, possibility. As with the voting behavior approach, it does not require full specification of a model of political outcomes. In fact, it is essentially apolitical in that specific public choice institutions are not analyzed. Problems of logrolling that may give rise to difficulties with expenditure models, or voting studies in cases where issues are complex or decisionmaking is by representatives, appear to pose no difficulty for the property value technique. Further, the property market paradigm does not depend upon the existence of direct referenda on specific public service issues, a feature that potentially limits the application of voting analysis.

Most property market studies analyze property values directly. Under the postulates of this approach, property values reflect not only current tax and public consumption levels, but expectations of the future courses of these variables as well. Thus it may be that the appropriate long-term expected or permanent values of these variables are measured with error when current tax and expenditure levels are used. Comparisons of results from rental *versus* property value studies may be useful in providing information on the importance of this consideration.

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[16] For a different approach to the study of residential location decisions, see Bryan Ellickson (47). Stephen K. Mayo (72) uses a similar technique to study the Tiebout hypothesis.

[17] Actually these parameters can only be inferred from reported results since Harrison and Rubinfeld estimated inverse demand functions.

The property market paradigm follows directly from the largely untested assumptions that households, observed at a particular point in time, are in locational equilibrium, and that mobility costs can be safely ignored. A more practical consideration is that the level of public services is only one of a multitude of factors that may influence property values. Unlike the voting decision, which is exclusively related to public service valuations, choice of residence involves valuation of a number of nonmarket items, many of which may be unobservable to the researcher. This problem would be most severe if unobserved influences were correlated to public service levels, in which case proper specification of the hedonic price function would be difficult at best. An evaluation of these considerations will require further research.

CONCLUSIONS

Considerations of space have made it necessary to draw sharp and, perhaps, rather narrow boundaries about the topic surveyed here. Attention has been directed toward public choice theories and institutions, and analysis has largely been confined to preference revelation in the context of choice among levels at which goods are collectively provided. Given a level of collective provision it is frequently true that individuals can effectively choose the degree to which public facilities are utilized, and in such cases private costs associated with use are often significant. For example, a citizen can privately decide how often to visit a public recreation facility, and costs associated with use are measured in terms of the time and expense required to visit the site. Other illustrations are in the areas of public health care facilities or institutions of higher education where citizens may choose whether or not to incur the patient charges or tuition fees required to make use of these facilities. A substantial literature on such private choices has not been surveyed here—see Hirsch (63, pp. 13–18) for a brief summary. Rather, the studies outlined above have concentrated upon collective decisions regarding levels at which such services are made available to potential users.

It is clear that the study of demands for public services, as a field of inquiry, is in a formative stage. Precise statements regarding the shapes of demand functions for several services are not yet possible. Despite this, certain important qualitative conclusions are beginning to emerge. Among the most important of these is that questions regarding tax incidence and other distributive aspects of public policy cannot really be divorced from resource allocation questions, once the collective choice process, particularly in a democracy, is introduced. Many of the expenditure studies surveyed (9, 10, 16, 35, 38, 39, 46) have found that the structure of taxes and the distribution of tax liabilities (or tax prices) in the voting population exert a significant influence upon the levels at which services are provided. This general conclusion has received corroboration from studies of voting on tax levy referenda (8, 86, 95). Analysis of the allocative effects of taxes, long a central topic in traditional public finance, appears to be taking on an entirely new dimension. Closely related to this is the observed influence of renter *versus* home-owner residency status upon collective service outcomes. The hypothesis that renters perceive themselves as bearing only a fraction of the tax on properties they occupy has received support from empirical evidence in both the expenditure and voting analysis literature. The theoretical implications of these findings, as they relate to efficiency in the provision of public services, remain to be examined.

To date the three approaches summarized in this review have largely developed in a separate, unintegrated fashion. One of the few attempts to compare demand estimates from two different models was conducted by Peterson (86). In his study, utility maximization subject to a budget constraint was used to develop a general specification of demands for public education as a function of tax price, income, number of school age children, and State aid. Using observations on a set of school districts, Peterson estimated demands from voting data and compared them to results from a median voter expenditure model. The signs and relative magnitudes of parameters obtained from the two approaches were quite similar. Clearly, more studies of this type would be useful in corroborating results from a single approach. Beyond corroboration, however, the alternative approaches carry conceptual implications for one another that remain largely unexplored. If, for example, a property owner expects a change in the level of educational finance to result in a capital gain or loss, his voting decision will be altered from what a comparison of preference for education and expected tax liability would imply.

An area where future demand analysis may prove fruitful lies in the investigation of income and substitution effects of subventions from higher levels of government. Existing evidence, gleaned primarily from expenditure determinant studies is rather mixed—Gramlich (55). Though the received theoretical literature on public sector grants—James A. Wilde (112)—has not been cast in a public choice framework, the task of modeling it in such terms appears quite feasible.[18] Further, a collective choice approach to this topic may help to reconcile some of the anomalies apparent in existing empirical results.

As an assumption of convenience, the public sector demand literature reviewed here consistently specifies that services are equally available to all members of a jurisdiction (with the possible exception of differential educational benefits received by parents of school-age children). However, little systematic evidence has been offered to support this contention and, as Denzau and Mackay (43) point out, differences in availability can affect individual preferences and public choice outcomes. Among the approaches surveyed, analysis of voting patterns would seem best suited to examination of this topic.[19]

Aside from the use of more precise data and more careful econometric methodology, which will no doubt occur as the field matures, it is likely that future research will be extended in a variety of new directions. Past efforts have focused upon consumers' valuations and preferences, yet producing enterprises clearly have demands for services of roads and police and fire protection. The nature of these derived demands and the way in which they enter the collective choice process have received little attention from theoretical or empirical researchers. Further, the observation that many goods and services provided publicly are also privately available to consumers at a price (*e.g.*, education) appears another interesting area for future empirical study.[20] Finally, public sector demand models of the types reviewed here may find use in emerging theories of general political-economic interdependence—Frey and Schneider (52)—particularly at the local government level.

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[18] For attempts in this direction and some initial results, see Peterson (86), Lepper (68), Feldstein (49), and Ladd (67).

[19] It seems unlikely that expenditure-based models could shed light upon the effect of differential availability within jurisdictions. Further, to the extent that differences in availability is a spatial phenomenon, property market studies may be problematic since housing prices can vary geographically for a variety of reasons.

Perhaps the most important influence that this area of inquiry will exert lies in the notion that preferences for public services are qualitatively no different from preferences for private commodities. Growing evidence suggests that demands for public goods respond negatively to implicit prices and positively to incomes; thus consumption patterns are better analyzed in terms of demands rather than "needs" or "service requirements." Public goods are special, however, because the act of individual consumption is seldom explicitly price rationed (though an implicit *quid pro quo* exists in the tax structure for alternative public supply levels), and because public services are provided at a roughly uniform level for all persons in a jurisdiction. Since the act of using a service is not priced, we can generally expect congestion "or, as more commonly described in the 'view-with-alarm' literature, an insufficiency of supply"—Margolis (71, p. 545). An implication of uniformity in the level of provision is that the service demands of most citizens will not be exactly satisfied.[21] Part of the populace will feel that service levels are inadequate; others will view them as excessive or, more commonly perhaps, will complain that taxes and expenditures are too high. Both sides are, of course, correct from a private viewpoint, yet the only point of agreement would be a preference for lower unit costs. Clearly, improved productivity in government, though desirable, cannot reconcile differences in individual demands. Many perceived "problems" in local government may merely reflect such differences. If so, they will probably not yield to careful study or the application of expertise, for they are features inherent in the nature of collective choice.

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[20] Barzel and Deacon (14) offer a theoretical discussion, and Rubinfeld (95) presents preliminary evidence on this topic.

[21] This ignores the possibility that consensus will be reached through institution of a set of Lindahl taxes (Bergstrom and Goodman, 16, pp. 292–3) or via the Tiebout mechanism.

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NEEDS ASSESSMENT FOR MEDICAL SERVICES

[By Sam M. Cordes*]

INTRODUCTION

The American Medical Association's endorsement of medical care as a basic human right, similar pronouncements by U.S. presidents, and the expected enactment of national health insurance indicate that an individual's willingness and ability to pay is becoming an unacceptable criterion for rationing medical services. In other words, there is a near consensus that some basic quantity of medical care should be available and accessible to all persons regardless of their ability to pay. To the extent that this does not occur, unmet need exists. At present, there is little question that some individuals in both rural and urban areas do not have their needs for medical services fully met. What is not known is the exact extent of these unmet needs. Although this paper will not attempt to provide a definitive answer to this question, it will examine several key issues related to the assessment of unmet need. The paper is divided into four sections; The Difference Between Unmet Need and Unmet Demand; Assessment of Unmet Need Using An Absolute Standard of Need; Attempts at Assessing Unmet Need in Rural Areas From a Relative Perspective; and Summary and Concluding Comments.

THE DIFFERENCE BETWEEN UNMET NEED AND UNMET DEMAND

The *demand* for medical services is an economic concept that refers to the quantity of medical services an individual or community is able and willing to purchase. On the other hand, the *need* for medical services refers to the quantity of medical services an individual or community should have, regardless of economic considerations, in order to attain some desirable state of affairs such a "optimum health" (4, 5, 12, and 14).

If the quantity of medical services demanded exceeds the quantity supplied, excess or unmet demand exists; when the quantity of medical services needed exceeds the quantity supplied, unmet need exists. There is no reason to suspect any systematic relationship between unmet need and unmet demand. For example, figure 1a shows a situation in which excess demand exists, but there is no unmet need—in fact, at the assumed price of P_o more services (measured by the difference between Q_n and Q_s) are being supplied than are needed. In figure 1b, there is no excess demand at the assumed price of P_o, but there is unmet need (as measured by the difference between

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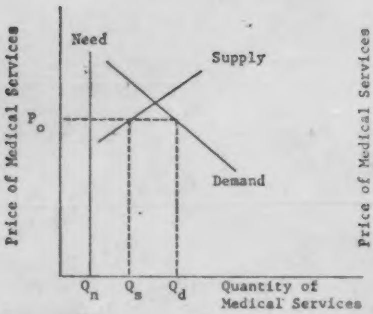
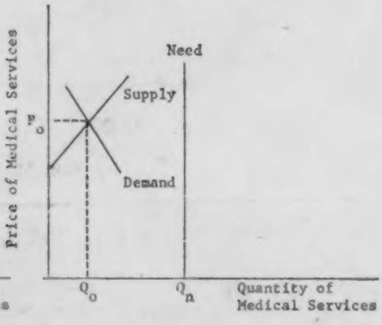


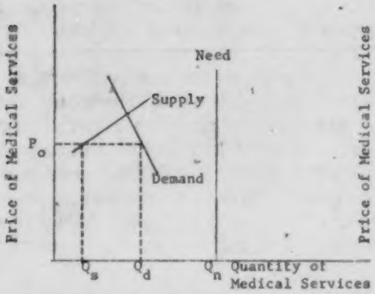
Unmet demand = $Q_d - Q_s$

Figure 1a.



Unmet need = $Q_n - Q_o$

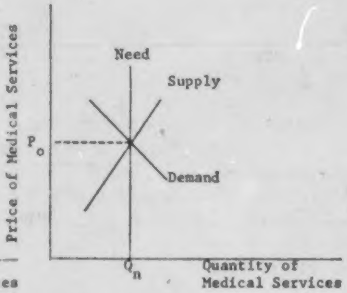
Figure 1b.



Unmet need = $Q_n - Q_s$

Unmet demand = $Q_d - Q_s$

Figure 1c.



No unmet need

No unmet demand

Figure 1d.

Q_n and Q_o). In short, it is mere coincidence if unmet need and excess demand exist simultaneously (figure 1c), or if there is neither unmet need nor unmet demand at a particular point in time (figure 1d).

ASSESSMENT OF UNMET NEEDS USING AN ABSOLUTE STANDARD OF NEED

Conceptually, unmet need can be viewed and measured in either absolute or relative terms. In this section the absolute approach is considered. Two major subsections are a discussion of two alternative bases for establishing absolute standards of need, and an assessment of unmet needs in rural areas using absolute standards of need.

Establishing Absolute Standards of Need

In determining the quantity of medical services needed it is possible to defer to the judgment of either the professional or the consumer. If the judgment of the consumer is relied upon, the quantity of health services needed can be represented by the quantity of health services the consumer would want to use if there were no concern for economic considerations. In more rigorous terms, this is the quantity demanded at a price of zero. In figure 2, this quantity is Q_c and providers of medical services will have to be paid a price of P_o—presumably from tax revenues—in order to be willing to supply enough services to meet this consumer-determined standard of need.

From the standpoint of professional medical practitioners or health planners, the consumer-determined standard of need, N_c, may be viewed as representing either too many, too few, or just the right amount of services. If it is viewed as representing too many services the professionally-determined standard will lie to the left of N_c; but if it represents too few services, the professionally-determined standard will lie to the right of N_c. In other words, from the professional perspective, some professionals believe overutilization of services will result if Q_c units of service are supplied and priced at zero, others believe underutilization will result, and others believe optimum utilization will result. If they believe optimum utilization will result, there is no conflict between the viewpoints of the professional and the consumer.

Those professionals concerned with "overutilization" base this concern on the belief that the population contains a significant number of either hypochondriacs or "the worried well," and that these persons should not have access to the quantity of services they desire at a price of zero. Attempts to discourage this "overutilization" include charging the consumer part of the cost. This is the rationale, for example, of the coinsurance and deductible provisions built into many of the national health insurance proposals. The general notion of reducing "overutilization" by cost-sharing can be illustrated in figure 2. In order to supply enough services to meet the professionally-

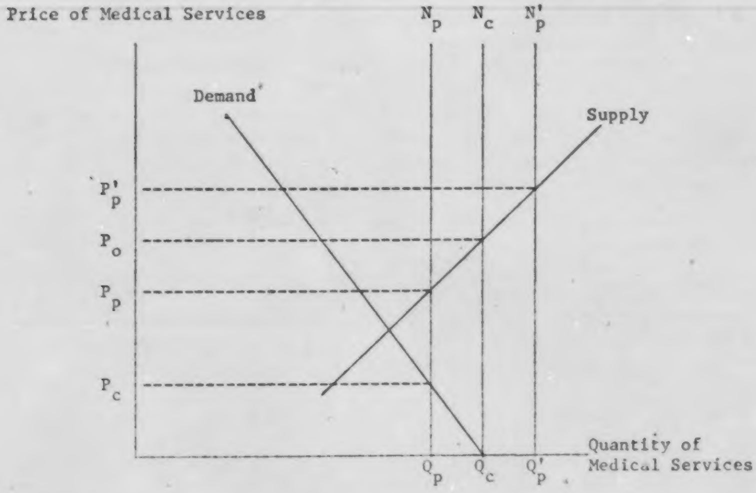


FIGURE 2

determined standard of need, N_p, providers will have to be paid P_p, and rationing these services can be accomplished by charging the consumer P_c.

Those professionals concerned with "underutilization," even when consumers use as many services as they desire at a price of zero, base this concern on at least three considerations: First, they believe the consumer may be fearful of medical services and/or ignorant of their benefit and therefore refuse or delay treatment. Second, they realize that the consumption of medical services may have significant positive externalities. If this is the case the quantity of medical services demanded at a price of zero will be less than optimum from the societal perspective, even if it is optimum for the individual. Third, these professionals believe the indirect costs of using medical services are quite high and will discourage use, even if the direct cost to the consumer is zero. These indirect costs include transportation costs and the opportunity costs of time spent in the well-named "waiting room." Indirect costs—especially transportation costs—are likely to be particularly high for rural residents. The situation of "underutilization" from the professional's perspective can be illustrated in figure 2 using the professionally-determined standard of need, N_p'. Producers will have to be paid a price of P_p' in order for them to be willing to supply enough services to meet the standard of need. However, not all of these services will be used (the amount of unused services is the difference between Q_c and Q_p'), even at a price to the consumer of zero. Two ways of encouraging use of services would be paying the consumer to use services or making the use of some services mandatory. The possibility of underutilization of services from the professional's perspective even when the price to the consumer is zero is not necessarily a rare occurrence. The recent swine flu program is a good example. Even before the negative side effects and publicity led to discountinuing the program, it was clear that the percent of the target population inoculated would not begin to reach the percent professionals said was optimum.

The researcher is not in a position to argue that either a consumer-determined or professionally-determined standard of need is the more appropriate. However, it is extremely important that researchers attempting to measure unmet need for medical services know which standard is being used, the implications of that standard, and that they are certain to convey this information to the users of the research.

Assessment of Unmet Need in Rural Areas Using Absolute Standards of Need

In the previous section, the term "quantity of medical services" was used as though medical services were a single product. While the use of this term creates no problem at a conceptual level, it is not an operational term because medical services include a wide array of specific services. This means a researcher cannot conclude that an unmet need of so many units of medical services exists in a given community. In view of this impossibility, other variables are used as indices.

One of the more popular indices is the supply of health resources, which is usually stated in a ratio form such as so many doctors or hospital beds per person. Unfortunately, even at the national level there is no agreement on what quantity of resources represent the optimum. At one extreme, Schonfeld, Heston, and Falk developed a professionally-determined standard calling for 133 *primary-care* physicians per 100,000 population (22). This standard was based on professional judgments as to what constituted "good" primary care and data on the frequency of conditions requiring this type of care. At the other extreme, Mason and Stevens have estimated that only about 100 physicians per 100,000 population are required to provide comprehensive medical services in prepaid medical practices (16, 25). Scitovsky and McCall have estimated that 148 physicians per 100,000 population are required in these type practices (23). The number of physicians per 100,000 population in prepaid medical practices represents a consumer-determined standard of need in that the direct cost to the consumer of using most of the services in these groups is at or near zero.

A comparison of the number of physicians per 100,000 population in nonmetropolitan areas with the above standards is fraught with difficulties, many of which will be considered subsequently. Despite the various qualifications which must be made, such a comparison is instructive and does in fact suggest that nonmetropolitan areas have unmet needs—at least for those services provided by physicians. In particular, nonmetropolitan countries with less than 50,000 population have only 67 M.D.s per 100,000 population (19, 20).

Another indication of unmet need in rural areas are the "horror stories" of rural persons—especially the rural poor—who needed medical services (by both professional and their own standards), but were unable to obtain them. Unfortunately, much of this information is of a case study nature or used to illustrate or emphasize medical deprivation. A much more systematic and thorough approach has been taken by Aday and Andersen. These researchers calculated "symptoms-response ratio" for various subgroups included in their national sample. This ratio "is based on the discrepancy between the actual number of visits to a physician for a given mix of symptoms and estimates from a panel of medical professional experts of the number of visits that should occur for these symptoms" (1, p. 44). As a group, rural farm residents in Aday and Andersen's sample made 21 percent fewer visits to a physician than "needed," but rural nonfarm residents made 2 percent more visits than "needed."

In sum, there has been very little research that has used an absolute standard of need—especially a consumer-determined standard—to measure unmet need for medical services in rural areas. Because of this it is difficult to quantify with any degree of precision the extent of such unmet need.

ATTEMPTS AT ASSESSING UNMET NEED IN RURAL AREAS FROM A RELATIVE PERSPECTIVE

Inferences about the extent of unmet need in rural areas have often been made by comparing rural areas to urban areas. Since there is no such thing as a "unit of medical service" these comparisons are usually based upon a comparison of other variables. The three variables or indices most commonly used are the per capita supply of medical resources, utilization of medical services, and health status. The limitations of these three indices will be considered before discussing some new and more promising indices.

Per Capita Supply of Medical Resources

Rural-urban comparisons of the per capita supply of medical resources show quite conclusively that urban areas have considerably more resources. This fact is frequently used as *prima facie* evidence to conclude that there is a greater unmet need for medical services in rural areas. This conclusion should not be so readily accepted without carefully analyzing and questioning the following seven assumptions upon which the conclusion rests:

1. *Unmet need exists in urban areas.*—If unmet need exists in urban areas, then having even fewer resources in rural areas would seem to indicate even greater unmet need in rural areas, *ceteris paribus*. But what if urban areas have more resources than are needed? While this is most assuredly not the case for all resources and in all urban areas (and in the inner city of most urban areas) it may be true in some situations. For example, urban areas have about twice as many general surgeons per 100,000 population as rural areas and research indicates that the incidence of elective surgery—some of which is likely to be "unnecessary"—is directly related to the number of general surgeons per 100,000 population (8, 15, 27). This suggests that rural areas should be most thankful that they have fewer general surgeons.

2. *Medical care needs of rural and urban persons are identical.*—This assumption is highly questionable. On the one hand, it can be hypothesized that the need for medical care is greater in rural areas because the rural population is generally older than the urban population; less affluent; less educated; and more frequently engaged in hazardous occupations such as mining, forestry, and farming. On the other hand, the tendency of urban areas to have more overcrowded housing, greater air pollution, and more violent crime increases the need for medical services in urban areas, *ceteris paribus*.

3. *The extent of commuting between rural and urban areas is self-canceling.*—This is one of the most questionable assumptions underlying rural-urban comparisons of the per capita supply of services. There is no question but what rural residents can and do commute to urban areas to receive medical services—especially the more specialized services. Other things being equal, this means a comparison of the per capita supply of resources between rural and urban areas will underestimate the quantity of medical services supplied to rural residents. However, this conclusion must be tempered by the possibility that urbanites will use services in rural areas, thereby reducing the supply of services available to the rural population and increasing the extent of their unmet needs. This possibility is frequently either not recognized or regarded as highly improbable. There are two reasons why this possibility should not be so readily dismissed.

First, a study of small-town Georgia physicians located 15 to 70 miles from the nearest urban area, found that almost 10 percent of their *regular* patients were from urban areas (10). Second, there exists another group of urbanites who use medical services in rural areas but who are not regular patients. Persons in this category include urbanites who are just "passing through" rural areas and those who flock to rural areas to ski, hunt, camp, and fish.

4. *Any exchange of medical resources between rural and urban areas is self-canceling.*—Medical manpower is a mobile resource that need not be confined to serving a particular geographical area. For example, physicians based at one location sometimes travel on a "circuit-rider" basis to other communities. Since most of the mobile medical manpower that moves between rural and urban areas is urban-based, the amount of services supplied to rural areas is underestimated by simply comparing the per capita supply of medical manpower.

5. *Rural and urban resources are equally productive.*—Productivity of resources varies for a number of reasons. For example, in the case of medical manpower, some persons are naturally more productive than others; and even among those with similar talents, productivity will likely be influenced by type of practice (*e.g.*, solo as compared to group practice) and the quantity and quality of capital facilities and equipment used in conjunction with the manpower.

Variation in the amount of time worked is also an important factor. For example, surveys show that rural physicians work substantially more hours per week than urban physicians. Since rural physicians also see more patients per hour than do urban physicians, the amount of services supplied in rural areas relative to urban areas is greatly underestimated by simply comparing the per capita supply of physicians.

6. *Rural and urban resources are of comparable quality.*—Much has been written about the alleged inferior quality of rural medical care resources. For example, it is asserted that the smaller hospitals which typify rural areas are less adequate and that rural doctors are less capable because they are overworked, older, and fail to keep in touch with the latest medical advances. Whether these assertions are valid is open to debate. However, the fact that the issue is debatable suggests that the assumption of comparable quality of resources cannot be unquestioningly accepted.

7. *The services produced by rural and urban medical resources are equally accessible.*—Even if the resources of rural and urban areas are of comparable productivity and quality, the amount of services actually supplied and consumed will likely vary because the services are not equally accessible. Important barriers to accessibility include inability to pay for services, distance, lack of transportation, traffic congestion, inclement weather, language barriers, racial discrimination, and office hours that do not mesh with the patient's schedule. Rural residents are likely to be at a distinct disadvantage to urban areas in terms of ability to pay and distance. This will tend to create greater unmet needs in rural areas relative to urban areas, *ceteris paribus.*

In terms of ability to pay, rural residents generally have lower incomes than urban residents and are not as likely to have health insurance. This increases the probability that services will not be used when needed. In terms of distance, the lower population density in rural areas means the average rural resident will be further from services than the average urban resident, even if both groups are served by a comparable set of medical services. This "cost of space" will impose a greater indirect cost of using services for the average rural resident, increasing the probability that services will not be used when needed. On the other hand, the greater problems of traffic congestion in urban areas impose an indirect cost of using services that rural residents typically escape, This increases the likelihood that urban persons will not use services when needed and thereby create greater unmet needs in urban areas relative to rural areas, *ceteris paribus*.

Utilization of Medical Services

In addition to focusing on the per capita supply of medical resources in rural areas relative to urban areas, much research has also gone into comparing the quantity of medical services used by rural residents relative to urban residents. This research on the use or utilization of medical services is sometimes used to draw conclusions about the extent of unmet need in rural areas. Typically, the conclusion drawn is that a lower (higher) rate of use in rural areas means these areas have a greater (smaller) unmet need for medical services. Drawing such a conclusion rests entirely on two assumptions:

1. Urban residents do not use more services than are needed (*i.e.* unmet needs exist in urban areas).
2. The need for medical services is the same in both rural and urban areas.

The validity of both of these assumptions was questioned in the previous section.

Health Status

The third common type of rural-urban comparison centers on various measures of health status, such as infant mortality rates, incidence of disease, and days of restricted activity. Using health status measures for drawing inferences about the extent of unmet need for medical services is based on the following traditional assumptions:

1. Health status is directly related to the quantity of medical services supplied.
2. Health status is inversely related to the need for medical services.

Accepting these two assumptions leads to the following inference: *Poor health status means unmet needs are relatively greater because poor health status means (1) fewer medical services are being supplied and (2) more medical services are needed.* Unfortunately, at least three alternative hypotheses can be formulated regarding the relationship between health status and unmet need.

Alternative Hypothesis I: Poor health status means there are no unmet needs for medical services, but means more services than needed are being supplied.—This hypothesis challenges both of the traditional assumptions by arguing that poor health status is *caused* by too many medical services, and fewer services are therefore needed. This hypothesis is based on the arguments of Illich and others who believe unnecessary surgery and iatrogenic illness are commonplace, and the use of health services creates rather than solves health problems (8, 11, 27).

Alternative Hypothesis II: Poor health status says nothing about the extent of unmet need because it means more medical services have been and probably are being supplied but more are also needed.—The argument underlying this hypothesis is that the greater availability of services at one point in time prevents some persons from dying, but those persons are likely to be more susceptible to other health problems in the future, and more services will therefore be needed. Sanders has argued from this perspective as has Wildavsky who refers to this situation as the "Paradox of Time [in which] past successes lead to future failures" (21, 28).

Alternative Hypothesis III: Poor health status says nothing about the extent of unmet need because health status is not influenced by the quantity of medical services supplied.—While Sanders believes the immediate effect of medical services is positive and Illich believes it is counterproductive, others believe medical services basically have neither a positive nor negative effect on health status as typically measured (9, 17). They believe, instead, that most illnesses are self-limiting or beyond the scope of medical care and that the major factors influencing health status are heredity, environment, and personal life styles (3). The evidence in support of this position is quite persuasive. Although those who argue this point reject the use of health status as an indicator of the quantity of medical services supplied, they do not necessarily reject it as an indicator of need. The reason for this is that they believe persons with poor health status need more medical care because it does provide (1) information about their condition, (2) psychological reassurance, and/or (3) relief of pain.

New and Promising Indices

Trying to assess unmet needs in rural areas by making rural-urban comparisons of the per capita supply of medical resources or the utilization of medical services presents two basic problems: the need for medical services may differ between these two areas, and one or or both areas may have more resources and/or use more services than are needed. On the other hand, comparisons of health status may be an appropriate indicator of comparative need (unless one subscribes to Illich's school of thought) but probably tells little about the extent of *unmet* need because health status is likely to be a poor proxy for the quantity of medical services supplied. The obvious solution to the problem of using these three popular but highly questionable measures of unmet need is a method that simultaneously measures either (1) the need for and use of medical services or (2) the need for medical services and the per capita supply of medical resources. Unfortunately, work along these lines is in its infancy. However, three notable exceptions are the symptoms-response ratio mentioned earlier, and HEW's use-disability ratio and index of medical underservice.

The use-disability ratio is expressed as the number of visits to a physician per 100 days of disability. Aday and Andersen calculated this ratio for both rural and urban persons in their 1971 sample and found the use-disability ratio was lower for rural persons. If it is assumed that unmet need exists in urban areas, then the findings of Aday and Andersen suggest even more unmet need exists in rural areas (1).

While the symptoms-response and use-disability ratio simultaneously measure the need for and use of medical services, the index of medical underservice simultaneously measures the need for medical services and the per capita supply of medical resources. This index is an aggregation of four factors considered descriptive of medical underservice: physician-population ratio of primary-care physicians, infant mortality rate, percent of population age 65 and over, and percent of population with family incomes below the poverty level (18, 26). Unlike the symptoms-response and use-disability ratio, this index uses secondary data to calculate a value for counties, and in some cases, minor civil divisions. The validity of the index obviously depends upon the extent to which physician-population ratios are an accurate measure of the quantity of medical services supplied and the extent to which the other three factors are accurate measures of the need for medical services. To date, a comparison of the index values between rural and urban areas has not been undertaken, but it is probably safe to conclude that rural areas will score well below urban areas. The reason for this tentative conclusion stems from the fact that rural areas have proportionately fewer primary-care physicians and proportionately more elderly persons and persons in poverty.

Finally, consumer satisfaction with access to medical services has received surprisingly little attention as a measure of unmet need. The only notable research along these lines is that of Aday and Andersen. They found that rural people—especially the nonfarm population—are more dissatisfied than urban people with respect to length of office waiting time, availability of care after hours, and ease of getting to care (1). In terms of this approach, those persons most dissatisfied would be presumed to have greater unmet needs. The lack of research attention to this approach is probably because researchers, policymakers, and professional health personnel question its validity because it is based on consumers' perception. Such a pessimistic view is rather ironic in light of the extremely questionable validity of the three more popular indices of unmet need—the per capita supply of medical resources, utilization of medical services, and health status.

SUMMARY AND CONCLUDING COMMENTS

Unmet need is not to be confused with unmet demand. Unmet need for medical services exists when the quantity needed exceeds the quantity supplied. Standards of need can be either professionally- or consumer-determined, and there is no *a priori* reason to suspect that the standards coincide. Although unmet need for medical services undoubtedly exists in rural areas, there has been no research that has quantified, with any degree of precision, the extent of this unmet need. What is often done in lieu of this is to make rural-urban comparisons in terms of the per capita supply of medical resources, utilization of medical services, and health status. The validity of using these comparisons to draw inferences about the extent of unmet needs in rural areas is extremely questionable. Much more promising efforts include Aday and Andersen's work on operationalizing a use-disability ratio and symptoms-response ratio, and their measures of consumer satisfaction.

In concluding, it should be noted that the fact that we do not know the exact extent of unmet need in rural areas does not really mean we need more research to find the precise answer. This would likely be a waste of research. For purposes of simplicity, this paper made frequent references to rural areas as though they were homogeneous. Obviously this is not the case. What is really needed is research that leads to a specification of those rural areas (and urban areas) in which the unmet need for medical services is greatest. For example, Copp hypothesizes that the real rural medical care problem is confined to 12 subpopulations within rural areas (7).

Isolating those areas with the greatest unmet need will require a careful screening, and perhaps some refinements, of the indices discussed in this paper. Altman and Steinwald provide interesting insights on procedures for making some of the refinements (2, 24). The three most popular indices—per capita supply of medical resources, utilization of medical services, and health status—are of such questionable validity they must either be validated or abandoned. Validating these indices as a measure of unmet need requires research on the basic assumptions underlying the inferences and conclusions drawn from these indices. These basic assumptions have been carefully specified in this paper.

In general, most of the indices used to assess unmet need for medical services are proxy measures based on secondary data. More primary data on unmet needs, as perceived by consumers as well as professionals, must be collected and analyzed in order to validate or invalidate the secondary data. If the secondary data are validated, then the policymaker and planner can revert to using the less expensive and more readily available indices of unmet need, such as physician-population ratios. The collection of primary data by Aday and Andersen on consumers' perceptions of access to medical services is an exemplary model (1). Noteworthy attempts to elicit professionals' perceptions include the work of Kehrer and the Bureau of Community Health Services (6, 13).

Finally, it must be remembered that reducing unmet need for medical services can be accomplished by either increasing the supply of services or reducing the need for services. Unfortunately, our society seems to be preoccupied with increasing the supply of medical services. A better way of avoiding extensive unmet need for medical services is through effective preventive and positive every-day health practices that minimize the initial level of need.

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CONSUMER RESPONSES TO RURAL PUBLIC SERVICE PROBLEMS IN GREAT PLAINS STATES

[Lonnie L. Jones and Larry C. Morgan[*]]

The Great Plains Technical Committee on Rural Development (NC–102) is in the process of conducting a survey of rural consumers of public services to ascertain primary sources, public and private costs, problems with services and needs for change as perceived by users. Four contributing States (Nebraska, North Dakota, South Dakota, and Texas) completed collection and tabulation of sample data in time for that data to be included in this paper. The committee agreed that the informational value to this Conference would be greatly increased if aggregate data were presented for all four States, rather than individually. The authors compiled the individual State data into a four-State composite for this purpose. As such, the information contained in this paper is something of a preview of a more comprehensive and detailed analysis of consumer perspectives and assessment of rural public services yet to be completed for the Great Plains region and for contributing States. The individuals responsible for conducting the survey in respective States were Drs. Paul Gessaman (Nebraska), Bill Nelson (North Dakota), Bill Kamps (South Dakota) and Lonnie L. Jones (Texas).

INTRODUCTION

Economists seldom deny that satisfaction of individual consumer demand should be the guiding force in the private market economy and that design and organization of economic units for production and delivery of goods and services should follow this central objective. In delivery of rural community services, most of which exhibit both public and private goods characteristics, the concept of user assessment of need or consumer satisfaction has received much less attention. Nevertheless, the idea that local user assessment of need should be a predominant factor in design of local public service delivery systems has guided much of the work of the NC–102 committee and has been elaborated upon elsewhere (1). A survey of residents of rural municipalities and open country residents was undertaken as a regional research effort in an attempt to gain information on local user opinions, attitudes and needs assessment relative to seven community goods and/or services, including: water, sewage, solid waste management, fire protection, law enforcement, education, and health. Results of this survey will provide basic information on community service cost, primary sources, problems, and local perspectives of quality and need for change. Five States are cooperating in this effort and results will be forthcoming in a regional report as well as individual reports from participating States.

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For purposes of this Conference, responses to four questions were abstracted from the questionnaires that reflect: (1) specific problems encountered by local users within the last 3 years, (2) problems that respondents would most like to see eliminated, (3) the willingness of respondents to pay an additional amount to eliminate those problems, and (4) whether or not respondents felt that they were getting their "money's worth" from expenditures made on specific services. We feel that responses to these questions taken together provide a basis for drawing implications about current problems that are of concern to rural people, the intensity with which the problems are viewed and the user's willingness to pay for problem elimination and quality improvement. These responses are, of course, subjective and we do not present the information as objective evaluations of rural service quality as might be made by comparison with some standard criteria. Instead, our purpose is to examine this subjective information and its value in assessing the need for change in rural community service delivery systems.

THE SURVEY DATA

The data presented in tables attendant to this paper are based on interviews from four States. Within each State, three sample counties were selected representing: (1) a relatively high density population, including one major trade center of about 20,000 population, (2) a medium population density county without a major trade center, but with one or more rural municipalities (2,000–5,000 population), and (3) a low population density county with primarily open country residents. A random sample of residents was interviewed within each county (excluding the trade center of the high density county) using basically an identical questionnaire for those questions to be used in a regional report. City blocks served as sample frames within municipalities. In the open country, sample frames used varied from State to State and included townships, sections, square mile blocks, main and secondary roads, etc. Techniques were sufficiently similar to allow aggregation. Both heads of households and wives of male heads of households were interviewed. Only that information on the questions mentioned earlier was abstracted from the questionnaires for purposes of this paper. Data reported herein are based on 1,200 interviews.

Water

About 40 percent of the respondents reported no problems with water service (table1). Hardness was the most frequent water problem (18 percent) and it occurred with equal relative frequently in both municipal and open country areas. Problems with water quality, such as hardness, coloration, odor, iron, bacterial contamination and high salt content were of far greater concern than problems related to the operation and maintenance of water systems.

TABLE 1.—WATER PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Hardness	126	18.5	148	18.3	69	30.0	84	31.5	23	25.9	46	33.3
Off-color	62	9.1	18	2.2	28	12.3	7	2.6	8	9.0	4	2.9
Odor	36	5.3	15	1.9	9	4.0	4	1.5	5	5.6	1	.7
Iron	24	3.5	36	4.4	14	6.1	20	7.5	6	6.7	8	5.8
Bacteria	1	.2	8	1.0			2	.8			1	.7
Salt and other minerals	20	2.9	18	2.2	13	5.7	8	3.0	6	6.7	1	.7
Bad taste	46	6.8	19	2.3	20	8.8	5	1.9	11	12.4	2	1.5
System failure	19	2.8	73	9.0	18	7.9	40	15.0	1	1.1	17	12.3
Inadequate supply	39	5.7	50	6.2	32	14.0	42	15.7	17	19.1	25	18.1
Slow and unreliable repair	6	.9	25	2.9	2	.9	8	3.0			2	1.5
Other	31	4.6	71	8.8	23	10.0	47	17.5	12	13.5	31	22.5
None	271	39.7	332	40.0								
Total	681	100.0	811	100.0	228	100.0	267	100.0	89	100.0	138	100.0

Among respondents who stated a particular water service problem that they would most like to see eliminated, water hardness was again most frequently mentioned (31 percent), and with equal relative frequency in urban and rural areas. In about 29 percent of the cases, elimination of problems related to the operation or maintenance of water systems were thought to be most important.

After asking the respondents which problem most needed to be eliminated, they were asked if they were willing to pay more to eliminate that problem, without regard to whether the payments would be private or public. In the case of water, about 46 percent of those identifying problems that needed elimination also were willing to pay more for elimination. Respondents who answered the question were most willing to pay more to eliminate water hardness (30 percent), with rural respondents expressing a slightly higher willingness to pay than urbanites.

Sewage Disposal

About two-thirds of the respondents mentioned no sewage disposal problems during the last 3 years (table 2). The most common problem was clogged drainfields, but it was reported by only 13 percent of the respondents, with about equal relative frequency in rural and urban areas.

Respondents also viewed clogged drainfields as the problem that most needed to be eliminated, with more urbanites expressing concern (48 percent) than rural residents (32 percent). Among respondents willing to pay to eliminate a problem (32 percent of those identifying problems to be eliminated), clogged drainfields was the problem most frequently mentioned (36 percent), again with a greater relative willingness to pay among urbanites (43 percent) than among rural people (28 percent).

Solid Waste Disposal

About two-thirds of the respondents reported no solid waste disposal problems (table 3). The most frequent problem, blowing refuse, was reported by only 8 percent of the respondents. Problems with rats and other animals attracted to solid waste were mentioned in about 7 percent of the cases and they were relatively more than twice as frequent in urban areas as in rural areas. About 6 percent of the respondents reported other diverse problems as the third most frequent problem category.

With regard to identifying the solid waste disposal problem that most needed to be eliminated, the three categories mentioned above were again cited, but in reversed order of importance: "other," 28 percent; problems with rats and other animals, 24 percent; and blowing refuse, 17 percent. Urban and rural people cited these problems with equal relative frequency, except that rural people objected to blowing refuse four times more frequently than did urbanites.

About 33 percent of the persons who identified a solid waste problem that most needed elimination were also willing to pay more for eliminating it. These respondents were most frequently willing to pay to eliminate "other" solid waste disposal problems (28 percent), followed by problems with rats and other animals (25 percent) and frequency of refuse pick-up (18 percent). Urban and rural people were willing to pay to eliminate problems of frequency of refuse pick-up with about equal relative frequency, but twice as many urbanites were willing to pay to eliminate "other" solid waste disposal problems.

TABLE 2.—SEWAGE DISPOSAL PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Odor	42	7.3	33	4.7	26	18.9	29	14.7	8	13.2	6	13.0
Pipe breakage	23	4.0	19	2.7	13	9.5	8	4.1	6	9.8	1	2.2
Plugging of drainpipes	80	14.0	81	11.5	65	47.5	63	32.0	26	42.6	13	28.3
Inadequate capacity	19	3.3	57	8.1	15	10.9	35	17.8	11	18.0	1	2.2
Slow and unreliable repair	7	1.2	13	1.8	2	1.5	3	1.5			2	4.4
Overloaded drainfield	5	.9	42	5.9	4	2.9	32	16.2	4	6.6	10	21.7
Other	18	3.1	34	4.8	12	8.8	27	13.7	6	9.8	13	28.2
None	379	66.2	427	60.5								
Total	573	100.0	706	100.0	137	100.0	197	100.0	61	100.0	46	100.0

TABLE 3.—SOLID WASTE DISPOSAL PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Odor	22	3.3	13	1.9	3	1.9	5	5.1	3	6	1	3.1
Blowing refuse	64	9.5	42	6.2	12	7.7	32	32.7	4	8	4	12.5
Fires	16	2.4	9	1.3	3	1.9	4	4.1	2	4	1	3.1
Noise	3	.5	1	.2								
Rats and other animals	71	10.6	24	3.6	42	26.9	20	20.4	16	32	5	15.6
Frequency of pickup	38	5.6	8	1.2	31	19.9	7	7.1	9	18	6	18.8
Sloppy pickup (spills)	43	6.4	3	.5	22	14.1	2	2.0	8	16		
Other	49	7.3	35	5.2	43	27.6	28	28.6	8	16	15	46.9
None	367	54.4	538	79.9								
Total	673	100.0	673	100.0	156	100.0	98	100.0	50	100	32	100.0

Fire Protection

In the case of fire protection, approximately four-fifths of the respondents reported no problems during the last 3 years (table 4). The types of problems encountered were diverse and infrequent. The most frequently encountered fire protection problem (6 percent) consisted of numerous problems categorized as "other", with a slightly higher relative frequency encountered in open country areas.[1] The next most frequently encountered problem, slow response, was reported by only 1.9 percent of the urban respondents, and 5.8 percent of the open country residents.

The "other" category (32 percent) was the most frequently reported problem that most needed to be eliminated. Slow response time (24 percent) was cited slightly more frequently than insufficient water supply (22 percent) with slightly higher proportions of rural people citing both problems. Poor organization was cited entirely by rural people and slow response time was cited more frequently by rural people than by urban people.

The "other" category was also the most frequently reported fire protection problem that most needed to be eliminated (32 percent). Urbanites were willing to pay to eliminate this category almost twice as frequently as rural people. About 27 percent of the respondents were willing to pay more to eliminate insufficient water supply with rural respondents being slightly more willing to pay.

Law Enforcement

About four-fifths of the respondents reported no law enforcement problems during the last 3 years (table 5). The most frequently encountered problem was unequal law enforcement policies (3 percent), followed by: lack of personnel; problem personnel in law enforcement agencies; and lax law enforcement.

The most frequently cited law enforcement problem that most needed to be eliminated was unequal enforcement (21 percent) and it was cited more than three times as frequently by urban residents than by rural people. About 16 percent of the respondents cited lack of personnel as the problem that most needed to be eliminated and it was cited slightly more frequently by urbanites.

Only 23 respondents were willing to pay more to eliminate a particular problem in law enforcement. Lack of law enforcement personnel was the most frequently cited problem (39 percent) for which respondents were willing to pay more, and it was cited entirely by urbanites.

Education

About 42 percent of the respondents reported no serious education service problems during the past 3 years (table 6). The most frequently encountered problem category, "other" (23 percent), included many diverse problems such as drugs, government interference, lack of discipline, and too many extracurricular activities. This category was cited slightly more frequently by urban residents than by rural residents. The next most commonly encountered problem, high costs of education (11 percent), was cited almost twice as frequently by rural residents as by urbanites.

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[1] Since data were first aggregated by individual State contributors, the "other" category could not be disaggregated for purposes of this paper. Treatment of these diverse responses will no doubt demand further attention for the NC-102 technical committee.

TABLE 4.—FIRE PROTECTION PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Poor organization	3	0.6	8	1.2	0	-------	6	5.1	0	-------	2	4.1
Insufficient water supply	12	2.3	35	5.3	12	21.4	27	23.1	7	24.1	14	28.5
Faulty equipment	8	1.5	7	1.1	6	10.7	4	3.4	5	17.2	3	6.1
No fast reporting system	6	1.1	21	3.2	5	8.9	17	14.5	2	6.9	9	18.4
Slow response	10	1.9	38	5.8	10	17.8	31	26.5	2	6.9	9	18.4
Other	25	4.7	43	6.5	23	41.2	32	27.4	13	44.8	12	24.5
None	463	87.9	505	76.9	-------	-------	-------	-------	-------	-------	-------	-------
Total	527	100.0	657	100.0	56	100.0	117	100.0	29	100.0	49	100.0

TABLE 5.—LAW ENFORCEMENT PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems [1]			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Unequal enforcement	29	5.8	4	0.7	26	30.2	5	7.9	4	21.0	1	25.0
Lack of personnel	19	3.8	8	1.3	16	18.6	8	12.7	9	47.4		
Problem personnel	20	4.0	6	1.0	15	17.4	6	9.5	1	5.3	1	25.0
Distance of law enforcement officials	5	1.0	14	2.4	4	4.6	12	19.1	1	5.3	1	25.0
Inadequate service	8	1.6	10	1.7	8	9.3	8	12.7				
Lax enforcement	11	2.1	15	2.5	8	9.3	14	22.3			1	25.0
Inadequate communication	3	.6	5	.8	3	3.5	5	7.9				
Other	13	2.6	9	1.5	6	7.0	5	7.9	4	21.0		
None	393	78.5	520	88.1								
Total	501	100.0	591	100.0	86	100.0	63	100.0	19	100.0	4	100.0

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[1] Based on Texas and North Dakota data only.

TABLE 6.—EDUCATION PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
High costs	53	8.2	129	13.6	33	11.5	86	24.9	1	0.8	1	1
Lack of special courses	66	10.2	60	6.3	48	16.7	34	9.9	34	27.0	20	20
Schools too small	34	5.3	37	3.9	18	6.3	18	5.2	14	11.1	11	11
Schools too large	5	.8	16	1.7	1	.4	8	2.3			4	4
Not teaching correct things	50	7.7	68	7.1	31	10.8	28	8.1	14	11.1	9	9
Inadequate equipment	22	3.4	20	2.1	5	1.7	5	1.5	3	2.4	3	3
Other	180	27.9	187	19.6	511	52.6	166	48.1	60	47.6	52	52
None	236	36.5	435	45.7								
Total	646	100.0	952	100.0	287	100.0	345	100.0	126	100.0	100	100

The "other" category was also most frequently cited (50 percent) as the education problem that most needs to be eliminated. This problem was cited in almost equal frequency by both rural and urban people. High educational costs were cited as the problem that most needed to be eliminated by about 19 percent of the respondents. This category was cited slightly more than twice as frequently by rural people as by urban people. The third most frequently cited problem that needed to be eliminated was lack of special education courses (13 percent). In this instance, the problem was cited almost twice as frequently in urban areas as in rural areas.

Of those respondents who were willing to pay to eliminate a particular educational problem (36 percent), the most frequent problem mentioned was the "other" category (50 percent), with about equal frequencies among rural and urban residents. The next most frequently reported problem was lack of special courses (24 percent), with a slightly higher frequency among urbanites than among rural people.

Health

About three-fifths of the respondents reported no health service problems during the last 3 years (table 7). Of those reported, most health service problems involved some perceived shortage of physicians. The most frequently encountered problem consisted of having to wait too long for an appointment (11 percent). Both of these problems were encountered with slightly higher frequency in rural areas than in urban areas.

Having to wait too long in a physician's office was viewed as the health service most needed to be remedied (47 percent), with a slightly higher frequency being reported in urban areas. The second most frequent problem to be remedied was having to wait too long for an appointment (24 percent). In this instance, a slightly higher frequency was reported in rural areas.

About 20 percent of the respondents identifying a health problem that most needed to be remedied indicated a willingness to pay more. The health service problem respondents were most willing to pay to have eliminated was waiting too long in a physician's office (36 percent). Willingness to pay for this problem was slightly more frequent in urban areas.

PERCEIVED VALUE OF COMMUNITY SERVICES

Respondents were asked to assess their satisfaction with each of the seven community services by indicating whether they were getting their money's worth from each service. The results indicate generally high satisfaction with community services, except education (table 8). There was also very little difference between urban and rural responses for each service. More than 90 percent of the respondents felt they were getting their money's worth from water and sewage disposal services. Almost 90 percent felt the same about solid waste disposal and fire protection services. About 80 percent of the respondents felt satisfied with police and health services. But only two-thirds of the respondents indicated satisfaction with spending on education.

TABLE 7.—HEALTH SERVICE PROBLEMS

Problem	Frequency encountered				Problems most needed to be eliminated				Willing to pay more to eliminate problems [1]			
	Municipal		Open country		Municipal		Open country		Municipal		Open country	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Unable to get appointment	20	3.6	43	5.9	17	10.7	32	15.2	7	17.1	8	23.5
Wait too long for appointment	50	9.0	95	13.1	34	21.4	57	27.0	6	14.6	10	29.4
Wait too long in office	98	17.7	136	18.9	78	49.1	97	47.0	18	44.0	9	26.5
No transportation	6	1.1	4	.6	3	1.9	2	.9	1	2.4		
Referred to another doctor and had to wait for appointment	14	2.5	17	2.3	5	3.1	6	2.8				
Other	30	5.4	21	2.9	22	13.8	17	8.1	9	21.9	7	20.6
None	337	60.7	408	56.4								
Total	555	100.0	724	100.0	159	100.0	211	100.0	41	100.0	34	100.0

TABLE 8.—MUNICIPAL AND OPEN COUNTRY RESPONSES TO THE QUESTION, "ARE YOU GETTING YOUR MONEY'S WORTH?", BY SERVICE, 4-STATE TOTALS

Service	Municipal				Open country				Total			
	Number of responses	Percent			Number of responses	Percent			Number of responses	Percent		
		Yes	No	Don't know		Yes	No	Don't know		Yes	No	Don't know
Water	527	94.8	2.7	2.5	631	92.9	4.0	3.1	1,158	93.8	3.4	2.8
Sewage	525	93.3	3.6	3.1	636	93.4	2.2	4.4	1,161	93.4	2.8	3.8
Solid waste	524	85.5	11.5	3.0	632	91.6	2.1	6.3	1,156	88.8	6.4	4.8
Fire	526	91.6	2.3	6.1	635	88.4	2.8	8.8	1,161	89.8	2.6	7.6
Police	525	83.2	10.1	6.7	636	78.3	11.0	10.7	1,161	80.5	10.6	8.9
Education	525	66.1	11.2	22.7	637	66.9	13.3	19.8	1,162	66.5	12.4	21.1
Health	527	83.5	8.9	7.6	625	78.1	13.4	8.5	1,152	80.6	11.4	8.1

It is striking that the three services with the lowest satisfaction levels are also relatively more labor intensive. These services, police, health, and education, are likely to be relatively less responsive to capital improvement programs that are typically created to improve rural community services.

SUMMARY AND CONCLUSIONS

Overall, almost 60 percent of the respondents reported no problems with the seven services included in this survey. Water service had the lowest frequency of "no problems" (40.4 percent), followed by: education (42 percent), health (59.1 percent), sewage disposal (63 percent), solid waste disposal (67.2 percent), fire protection (81.8 percent), and law enforcement (82.9 percent).

After reviewing problems that were deemed to be most in need of elimination, only one-third of the respondents were willing to pay more to eliminate the problem. Respondents were most willing to pay to eliminate water problems (45.9 percent), followed by: fire protection (45.1 percent), education (35.7 percent), solid waste disposal (32.7 percent), sewage disposal (32 percent), health (20.3 percent), and law enforcement (15.4 percent).

Positive responses to the question, "Are you getting your money's worth?" were uniformly high (about 90 percent) for water, sewer, solid waste, and fire protection services. But, positive responses were substantially lower for police, education, and health services.

The results of this survey seem to reflect a generally high level of contentment within the sample with the existing service systems. Even though a substantial percentage of respondents reported problems with services, their lack of willingness to pay more service quality improvement and their expression of satisfaction with present money spent on services implies that such problems may not be considered severe. There seems to be least contentment with the labor intensive, personal services—particularly education.

Results of surveys among the four States included were surprisingly consistent. If these results reflect a reasonably good measure of service users' assessment of service quality and need for change, certain implications seem to arise. First, there would appear to be less urgency for change in the minds of rural service users than is reflected in recent State and Federal legislation intended to improve the quality of each of the services included in this survey. If so, one might question the value of the increasingly stringent regulations being placed on rural delivery systems if user satisfaction is our ultimate goal. Secondly, users expressed least satisfaction with labor intensive services (police, education, and health) and relative satisfaction with the utility services of water, sewage, and solid waste. Yet, a cursory examination of public expenditures for economic development in rural areas reveals that public programs have concentrated largely on physical investments chiefly for water, sewage, and solid waste systems (3). While such programs generate highly visible and measureable changes in rural service systems, they may be less effective in stimulating the needed changes toward quality improvement as perceived by the users of the systems.

There seems to be evidence that the criteria for evaluating the quality of rural service systems used by consumers may be different from those used by researchers and those used in drafting regulations for implementing service quality legislation. It may be that researchers and public agencies tend to identify some set of objective criteria against which to decide upon quality (often composed of characteristics of urban systems) and transfer this set to the rural area as a minimum standard deemed appropriate for rural users. Responses to this survey seem to raise questions with this procedure.

One important factor that we have not as yet analyzed is the characteristics of the minority of people who *do* identify problems. Are they a minority who are actually being deprived of a service, or are they being deprived only in the sense that quality of the delivery system does not meet expectations that are higher than the average for the area? The answer to this question has implications for the legitimacy of local government's attempt to alleviate problems.

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PREFERENCE SURVEYS AND POLICY DECISIONS: OUR NEW TOOLS NEED NOT BE USED IN THE SAME OLD WAY

[By Don A. Dillman*]

Attempts to survey people's preferences (opinions and attitudes) and use the results to make policy decisions have given rise to two schools of thought on the subject. In simplistic terms, one school maintains that preference surveys are valuable and policymakers should use them. The other maintains they are not valuable and their use should therefore be avoided. The supporting arguments for each are as different as the positions. The optimism of those who would use them is based largely on certain ideological assumptions about the place of public opinion in a democracy. The pessimism of the latter stems largely from methodological criticisms of attempts to assess what people do and do not want. Debates between the two schools have thus pitted the hope of one group against the other's beliefs about what constitutes empirical reality.

My own view is that preferences have a place in the policymaking process as one of several kinds of information on which to base a decision, provided that they are satisfactorily measured. But, in the past, this goal has seldom been realized, primarily because of certain methodological and related cost constraints which have prevented surveyors from doing the kinds of surveys that would have great policy relevance.

Fortunately, the situation is now changing. Recently developed survey technologies, *i.e.*, reliable ways of collecting data by mail and telephone, now make it possible to overcome some of the pessimists' most important criticisms. But, even though the new technologies are being widely used to do preference surveys with explicit policy purposes, I believe that for the most part they are being done in the same inherently inadequate ways. The surveyor is therefore left open to the same criticisms as before. For the situation to change, it is necessary that our traditional approach to doing surveys be reconceptualized in line with the potential offered by our new survey technologies. This requires rethinking on the part of both the surveyor and the policymaker.

My purpose in this paper is to support the foregoing contentions. Specifically, I will enumerate the commonly offered arguments for and against the use of surveys for policy purposes. Then I will describe two models (A and B) by which surveys might be done. Model A is inherently inadequate for policy purposes, but remains the one most used by survey researchers. Model B is far more appropriate, but as yet little used. In light of these two models, I will next discuss

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the recent proliferation of attempts to do preference surveys, most of which have followed the Model A approach. Finally, I will describe an attempt to follow a Model B approach, and suggest steps that need to be taken if preference surveys are to be useful to policymakers as more than window dressing for their policy decisions.

ARGUMENTS FOR AND AGAINST THE USE OF PREFERENCE SURVEYS IN MAKING POLICY DECISIONS

Those who actively promulgate the use of preference surveys for policy decisions typically offer a two-part argument. The first part consists of the belief that a democratic society, such as we profess ours to be, should take its directives from people it is designed to serve. In short, society should not ignore people's wants because to provide them is what society is all about. Thus, the right of policymakers to decide important issues does not include the right to ignore what people say they want and do not want. The proponents of this position use the fact that the sentiment of society is on their side to full advantage. This places those who oppose the use of such surveys, for whatever reason, in a difficult position.

The second part of their argument is that a policy which people do not desire runs a great risk of being ignored. Or, worse yet, if the policy is implemented, it may be rejected and resisted by the people, thereby creating more problems than it was originally designed to solve. For quite understandable reasons, this argument is taken with great seriousness by most policymakers. And, frequently it has provided the impetus for ill-advised surveys that could not possibly assess with reasonable accuracy what people in fact wanted. In its most extreme form, advocates of this position have suggested using people's stated preferences as the sole basis for choosing one policy over another.

Those who are pessimistic about the usefulness of preference surveys as inputs to policy decisions also have a strong set of arguments, but they have been developed along quite different lines, with the focus being squarely on the ability of the surveyor to accurately measure preferences. Three of the most frequently offered criticisms are summarized here.

The first of these arguments is that: *People are not well enough informed or otherwise capable of stating their real preferences.* Proponents of this argument might reasonably ask, for example, whether people who never went to high school can adequately assess a community's educational needs or the higher educational needs of a State. Similarly, it could be asked whether someone whose experiences with community medical services have been limited to office visits with a general practitioner, and whose most important criterion for evaluating medical care seems to be the doctor's bedside manner, can adequately assess a community's medical needs. Advocates of this position also suggests that many, if not most, questions pertaining to the adequacy of community services are simply too complex to be understandable without a great deal of effort by the respondent. And, most people are either unable or unwilling to make such an effort.

The above argument directly confronts the second of the optimists' arguments—namely, a policy must be acceptable to people in order to be successful. This is because what people say they desire in terms of community services may not at all be what will satisfy them. It is not unusual for people to initially oppose an innovation, but once they have it, they begin to wonder how they ever got along without it. We should not be surprised, then, if people's stated preferences on a survey questionnaire provided very little support for, say, the development of mental health and counseling services; but for their attitudes to become quite positive once those services are established. Some would even suggest that the undeniable influence of people's past experiences on what they say and do makes their stated preferences a far better indicator of what they *like* about their *past* than of what they *want* for the *future*. Thus, this argument often becomes a most devastating criticism, especially against those who would use stated preferences as the sole basis for making a decision.

A second basis for rejecting the use of preference surveys in arriving at policy decisions is the belief that: *People's stated preferences are superficial and likely to change; thus, they provide an inadequate basis for making decisions with long lasting consequences.* It cannot be denied that people's views about things often change, sometimes quite radically. We might expect, then, that opinions about the need for a mental health center, and the willingness to pay for it, would be quite different a month before community residents write their semi-annual check for property taxes than for the following month. The possibility of significant change resulting from fairly trivial reasons hardly needs to be emphasized at this particular time, close on the heels of an election that saw one candidate almost lose the biggest preelection lead in history, and which was characterized by voter switches due less to the candidates' stands on major issues than the media's reflections of their styles, personalities, and occasional slips of the tongue.

The third criticism of preference surveys is: *The procedures used for assessing people's preferences are inevitably inadequate, leaving a very large gap between survey questions and the policy questions they were supposed to address.* This criticism covers a multitude of possible survey sins, any of which can potentially produce survey questions that have little or no relevance to the policy question. The problem is aptly illustrated by the attempt to ask very general questions in surveys, *e.g.*, "do you consider juvenile delinquency to be a serious, moderate, slight, or no problem in this community?" and use them to address a specific issue: should we increase the parks and recreation budget by 25 percent in order to hire someone to develop a summer recreation program for teenagers? To do this requires a very sizeable leap from the general to the specific, which at the very least involves some highly questionable assumptions about the linkage between juvenile delinquency and summer recreation.

Another example of an unwarranted attempt to go directly from a survey question to a policy recommendation can be observed when people are asked to respond to an assumed list of inadequate community services by indicating whether each service should be improved. The not too surprising finding emanating from such survey questions is that respondents want most, or all, of the listed services to be improved. This results in surveys being described as mere wish-books, and totally irrelevant to the formation of concrete policies. Even when their willingness to pay for the improvement of such services is ascertained, that support is very likely to be divergent from later actions.

The lack of correspondence between survey questions and the uses to which researchers attempt to apply them is not simply a matter of those researchers committing the same kinds of errors over and over again. In fact, surveyors are often attempting to measure wants and needs long before precise issues are defined and equally precise alternatives articulated. Thus, they must necessarily focus on *general* goals. In direct contrast, when we get to the actual procedure of decision-making, people's behavior in the voting booth reflects the *specific* means by which a goal is to be realized and extraneous issues which seem, on the surface at least, to have little relation to either the goals or the means. The problem here often has nothing to do with fundamental attitude change, but reflects a process of specifying and articulating the full dimensions of a particular decision.

I am reminded here of one of my very first survey efforts. The question seemed clear and simple: "Should our city build a new city hall?" Because of my penchant for reasonable protection from vacillating attitudes and a concern with question phrasing, I asked about the issue in a diverse number of ways. Analysis of the survey results revealed that all the answers showed near overwhelming support for building the city hall. Full 80 percent of the sample said they would vote "yes" if the election were held today. A mere 6 weeks later the electorate resoundingly defeated the proposal. What happened? Frankly, I do not possess that information, but the comments of the first three "no" voters I talked to after the election gave some clues. The first voter said that it was good to see a bond issue finally defeated in the city, and further advised me that now the city fathers would have something to think about. The next said that he would have voted for the proposal only if the city council had not bought the land before going to the voters for approval of the building. The third referred to the architect's drawing boldly displayed on the front page of the local paper and suggested that the need was for a city hall but not the "monument" that was pictured. Yet, all three reaffirmed to me that yes, a city hall was indeed needed. The frequent lack of correspondence between what people indicate they want in one way (a survey) at one time (6 weeks before an election), and what they do later in another situation (voting booth) at another time (election day), does little to build confidence in the worth of preference surveys. Rather, it leads many would-be users to conclude that it is just not possible to do meaningful preference surveys.

To a considerable extent I think the proponents and opponents of preference surveys tend to talk past one another. Neither side comes to grips with the issues raised by the other. In fact, it is not necessary to reject the arguments of one in order to accept those of the other. Thus, it should not be too surprising if we find many who accept both the pro and con arguments, and conclude with, "it would be nice to bring preferences to bear on policy decisions, if only it were possible." I am among those who believe it is possible, but only if our traditional approach to policy surveys is changed, something which is now possible because of our new survey technologies

TWO MODELS FOR POLICY SURVEYS

Past surveys have usually been approached in a very simplistic fashion (Model A in figure 1). Typically reliance has been placed in one-shot surveys, conducted quite independently from the actual policy setting process. Thus, instead of looking to policymakers for a clear definition of the policy issues, researchers have produced their survey questions mostly by means of armchair deliberations. These deliberations generally mean that previous surveys have been utilized as the main source of questions. And policymakers are consulted only informally if at all. General, rather than specific, attitudes are thus emphasized. In addition, the perceived need to get everything possible into one questionnaire has resulted in some important questions being left out. Once the survey is done, the results are normally commended to policymakers in a wholesale fashion accompanied with such vague recommendations as, "here's what the people say they want." Though efforts to use the results of preference surveys in conjunction with

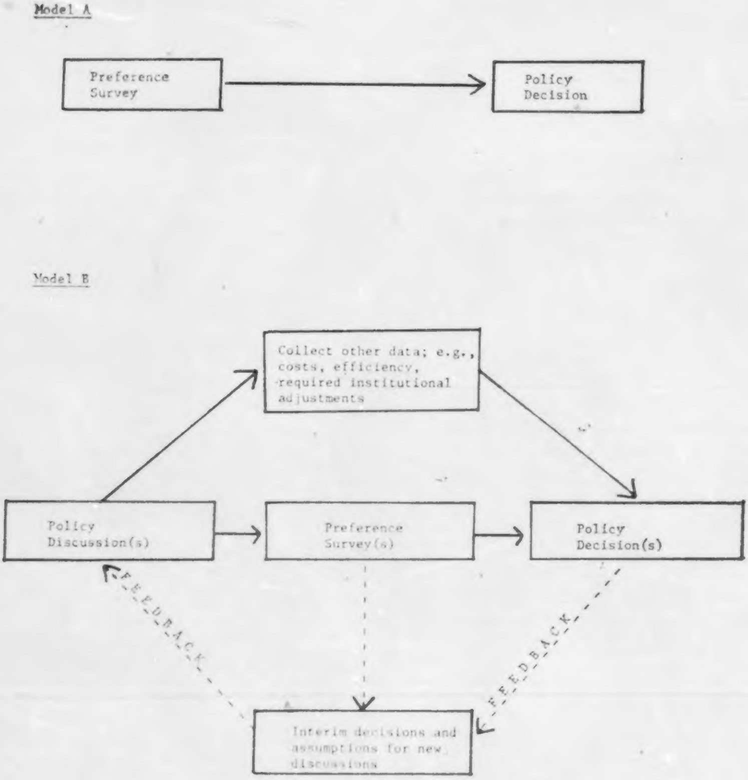
Model A
Preference Survey
Policy Decision
Model B
Collect other data; e.g., costs, efficiency, required institutional adjustments
Policy Discussion(s)
Preference Survey(s)
Policy Decision(s)
FEEDBACK
FEEDBACK
Interim decisions and assumptions for new discussions

FIGURE 1.—Two models for bringing stated preferences to bear on policy decisions.

other policy inputs are sometimes attempted, those efforts are doomed to failure by the sheer impossibility of linking calculations of concrete entities (*e.g.*, costs and efficiency), based on necessary specific assumptions, to generalized attitudes that make no such constraining assumptions. Clearly, then Model **A** leaves much to be desired in terms of striving towards surveys which can be employed in policy decisions.

Model B, on the other hand, suggests a far more useful, though as yet little used approach (figure 1). A survey satisfying the requirements of Model B is not an independently conceived entity. Rather, it is an integral part of the entire policy setting process. A survey does not get done until policy issues and alternatives have been clearly defined by the relevant decisionmakers. Any preference survey is clearly expected to be only one of many inputs to policy deliberations. Thus, the survey questions are designed in such a manner that they reflect the same basic assumptions as do the other policy inputs, and thereby become usable in combination with them. Multiple surveys are likely to be done, with the results of one survey providing the inputs to policy discussions that then lead to another, more precise survey. The ways which Model A and Model B differ are summarized in figure 2.

FIGURE 2.—HOW MODEL A AND MODEL B DIFFER.

	Model A	Model B
Number of surveys	1	Several.
Timing	Not too important. Usually prior to policy deliberations.	Very careful timing in relation to policy deliberations.
Source of questions	Reflection on issues; questions from past surveys.	Generated by policy deliberations.
Kinds of questions	General	Varies from general to extremely specific.
Pressures for selection	Get everything that might be relevant into 1 survey.	Get precise representation of policy issues and alternatives. Do not have to get everything into 1 survey.
Use	In isolation; occasionally attempt to use only policy input.	Specific effort to use in concert with nonpreference inputs.

A hypothetical scenario of how the surveys of a Model B policy setting process might evolve is shown in figure 3. It illustrates how each of the surveys might ask different questions, including nonpreference ones, as a means of producing the most appropriate data for use at each stage of the policy deliberations.

Model B overcomes the criticisms of the pessimists in these ways. It clearly recognizes that preferences are only one of several inputs into the policy process. They are to be juxtaposed with other decisionmaking information and not substituted for them, requiring that they be interpreted and not simply accepted in a wholesale fashion. Such deliberations would seem to require evaluation of the extent to which people are informed (which survey questions can measure) and the feelings of different segments of the population. The problem of change is dealt with by doing repeated surveys as the policy setting process evolves. Finally, the gap between the policy question and the survey question can be narrowed by making the policy deliberations serve as the source of the questions. Although a Model B survey cannot entirely eliminate any of the three problems it can go a long way toward finding solutions that will be satisfactory.

FIGURE 3.—*Hypothetical scenario for Model B surveys*

Time One—

Policy question: What do people see as the most important community problems? Where does the need for mental health services rank?

Survey Questions: Here are some things people have suggested to be possible problems about which something needs to be done in our community. Do you consider each of these (*e.g.*, poor streets and roads, drug use among teenagers, and the lack of counseling assistance for families in trouble) to be: a serious problem, a moderate problem, a slight problem, or no problem at all? Which of them do you consider the single most important problem?

Policy Action: Hmm! People do seem to see as problems those things about which a mental health center could do something. Those kinds of problems rank fairly high. But, is there an explicit need that is going unmet?

Time Two—

Policy Question: How great is the need for mental health services? Would people get something they are not getting now? Will they support the concept?

Survey Questions: Have you or anyone else in your family ever felt the need to talk to a trained counselor about personal of family problems? If yes, did you eventually receive that kind of help? From where did you receive it? There has been some talk about trying to get a Mental Health Center in our community. The services it might offer include. . . . Do you feel there is a need for such a service? Do you feel any reservations about the need for it? If so, what are they?

Policy Action: On the basis of survey results, and other information gathered to determine feasibility, decide whether to continue. If decision is affimative, then develop alternative designs, methods of funding, etc.

Time Three—

Policy Question: What kind of Mental Health Center will people support, under what conditions, and by what method?

Survey Questions: Here are the specific kinds of services that might be provided by a local Mental Health Center. . . . How essential do you believe it is that each one of them be provided in this community? There are various ways the building and operation of a local Center might be financed. Here are four options that, based upon what we now know, might be explored further. Which of them would you most and least favor and why?

Policy Action: Draw up final plans to be recommended to decisionmakers.

WHY MODEL B IS LITTLE USED

If Model B is superior to Model A, and of course I believe it is, then why has it not been used more frequently? There are three important reasons. First, our basic method for doing surveys has always been the face-to-face interview. Indeed, until recently it was considered the *only* method. The costs of implementing face-to-face surveys have always been high, but in recent years they have skyrocketed. Thoughts of doing several such surveys on a single issue, as called for in Model B, cannot realistically be entertained, especially when people are skeptical about the worth of investing in even one costly survey. Further, the policy setting process tends to be rather unpredictable; it is difficult to know exactly when a particular process will start moving. The uncertainties of when issues will become sufficiently well defined to warrant a survey effort therefore make it extremely difficult to obtain financing for a survey at the exact time it is most needed. Even when policy issues do become well defined, most organizations do not have sufficient current expense funds to mount a survey when and where the need strikes.

A second problem is that the implementation process for face-to-face interview surveys is usually slow. Policy setting deliberations, on the other hand, usually proceed fairly rapidly once they are initiated. And, it is the effort to resolve issues that often leads to the articulation of issues in specific enough terms that appropriate survey questions can be written. In addition, once the issues are defined, the policy group working on them may not be far from a decision, thus making it rather unenthusiastic about a 6 week, or longer, recess while waiting for a survey to get done and the results to become available. A community developer friend suggested to me that this resembles getting all dressed up to go to a party only to find out it has been indefinitely postponed.

Finally, useful Model B surveys demand that the survey researcher make his or her activities an integral part of somebody else's efforts. Thus, the researcher is required to spend a great deal of time interacting with decisionmakers. This is because decisionmakers do not normally understand the problem of doing surveys and survey researchers do not normally understand the policy problem. Subordinating a survey to a policy process means the exact timing and content of particular surveys become somewhat unpredictable. To put it in rather blunt terms, this means that survey researchers must sacrifice their independence to plan, conduct, and report surveys in their own way at their own pace. For many, if not most, dedicated researchers, the loss of that independence is deemed a heavy sacrifice.

NEW SURVEY TECHNOLOGIES AND HOW THEY HAVE BEEN APPLIED

The specific tools that allow us to overcome the above mentioned limitations in conducting Model B surveys are the coming of age of the mail and telephone as viable survey techniques. Until recently, and for good reason, both have been considered inadequate as survey methods. But, recent improvements now make it possible to use lengthy questionnaires and consistently achieve response rates of 70 percent and upwards by mail, and 85 percent and higher by telephone (6, 7, 8). Surveys done by these two methods can now produce results that are competitive with those attained via face-to-face interviews, in terms of both quantity and quality (9). Their low cost also makes it possible to look to current expense budgets for enough money to achieve meaningful surveys. Further, the ease of implementation facilitates doing them when the policy need arises and for doing them very quickly. All of these attributes are prerequisites for doing most Model B surveys.

Improvements in the mail survey method have spawned several recent and exceedingly ambitious attempts to conduct State and community needs surveys (3, 4, 5, 10, 11, 12, 14). Several of them have captured a great deal of attention and applause from policymakers. Only one reason for this attention has been the high response rates attained by the surveys—68 to 80 percent on questionnaires which are at least 10 pages in length. The low cost of doing them has enabled investigators to employ large sample sizes, ranging from 4,500 to 22,000 in the surveys. As a result, the survey findings are generalizable to subregions of the State, and in some cases even to individual cities and counties. These studies have additionally provided an unprecedented opportunity to make intrastate, and in some cases interstate, comparisons. These facts alone have quite appropriately stimulated attention from policymakers and others.

Despite the significant accomplishments of these recent surveys it is quite apparent that they have been conceptualized and implemented more in line with Model A than Model B. All have been one-shot surveys covering a wide array of issues. Thus, the coverage allocated to any one policy issue has been rather superficial. To the best of my knowledge, none of the surveys were carried out as an element of a sustained policy process. Such a process would have 1) produced the survey, 2) relied on the findings for data that would be juxtaposed with other information that was then being produced by the process, and 3) used the results as a basis for making specific policy decisions, or as a basis for discussions that would produce another round of surveys.

Perhaps the most important way in which they reflect a Model A approach is in the generality of the questions asked, as shown in figure 4. In this figure I have listed exemplary questions from the surveys, taking them from the sections in which community service items were included. An examination of the types of questions asked in the various surveys reveals that virtually all of them have relied on ordinal kinds of response formats, *e.g.*, "no," "slight," "moderate," or "serious" (problems), and "less," "same," "more" (services), each of which is used in five of the seven surveys. Although formats such as these do well in capturing gradations of feelings, they do not exhibit the precision that is ordinarily implied by concrete policy decisions.

FIGURE 4.—*Examples of questions asked in recent community and State needs assessment surveys*

1970: PRIORITIES FOR SPENDING PUBLIC FUNDS (WASHINGTON STATE, N=4,500) (5)

A. Government spends public funds in many areas, some of which are listed on this page . . . Please indicate whether you would favor government spending less money, the same amount, or more money than is now being spent.

(15 items: *e.g.*, public education, health and medical care, and help for those in poverty)

B. Listed below are some problems faced by many U.S. communities. Please indicate to what extent you think each of the items on this list are problems in your community for which a solution is needed, using these responses: no (not a problem), slight, moderate, or serious.

(14 items: *e.g.*, adequacy of medical care, availability of goods, jobs, and adequacy of schools)

1973: YOUR OPINION OF PROBLEMS FACING YOUR COMMUNITY AND STATE (NORTH CAROLINA, N=5,000) (4)

A. Government (Federal, State, and local) spends public money in many areas, some of which are listed below. Please indicate whether you feel that no, less, the same amount, or more public funds should be spent in these areas.

(32 items: *e.g.*, solid waste disposal, airport facilities, and public kindergarten program)

B. Please indicate the seriousness of each of the following problems for your community, using these responses: no, slight, moderate, or serious.

(32 items: *e.g.*, adequacy of law enforcement, adequacy of fire protection, and adequacy of libraries and museums)

1974: THE FUTURE OF THE PIERCE COUNTY AREA (PIERCE COUNTY, WASHINGTON, N=1,300) (11)

A. Listed below are some issues which have been mentioned as possible problems now facing residents of Pierce County. We would like to know to what extent, if at all, you feel each is a problem in need of solution. Indicate whether you feel each is not a problem, a slight problem, a moderate problem, or a serious problem.

(18 items: *e.g.*, movement of businesses away from downtown Tacoma, the loss of corporation headquarters from Pierce County, and the adequacy of sewage disposal systems in suburban areas)

B. Residents of the Pierce County area receive benefits and services from the Federal, State, county, and municipal governments. In addition, there are over 50 local taxing districts providing services to various parts of the county. Among them . . . we would like you to rate the general quality of services you feel you receive from these governments and taxing districts listed below (poor, fair, good, or excellent).

(9 items: *e.g.*, fire district, your sewer district, and Port of Tacoma)

C. On these two pages we have listed some ideas that various citizens of Pierce County have mentioned as possible goals we should work toward. Please indicate how you feel by indicating whether each one should not be a goal or should be a low, medium, or high priority goal for the Pierce County area.

(30 items: *e.g.*, more leisure and cultural facilities for local residents of Pierce County, encourage recreation by restricting aquacultural farming (fish and oyster to a minimum), and prohibit further urbanization of flood plains, *i.e.*, Nisqually, Puyallup Valley)

1975: STUDYING YOUR COMMUNITY (RURAL COMMUNITIES, NORTH CENTRAL IOWA, N = 5,920) (10)

A. How much do you think the following items need to be improved in this community? Indicate whether each item needs to be improved much, some, or none.

(20 items: *e.g.*, utilities, health care, and religious opportunities)

B. Here are some statements about this community, communities in general, and other things local residents may think about. Please indicate whether you strongly agree, agree, are undecided, disagree, or strongly disagree with these statements.

(15 items: *e.g.*, if regional consolidation of local government services would save money and keep taxes down, I would be in favor of consolidating these services; the most rewarding organizations a person can belong to are local clubs and associations rather than large nationwide organizations)

1975: YOUR OPINION: NORTH CAROLINA TODAY AND TOMORROW (NORTH CAROLINA, N = 15,600) (3)

A. State government in North Carolina spends public tax money in many areas. Please indicate using the four response categories (less, same, more, or +Tax—meaning you want more money spent and would be willing to pay higher taxes if necessary) whether you feel that more or less State funds should be spent on the areas listed below. Remember if you want more tax money spent in some area, less tax money will have to be spent in other areas unless taxes are increased.

(46 items: *e.g.*, county health department (4 million now spent), child welfare services ($3.1 million), and promotion of tourism ($1.3 million))

B. Now please give your opinion concerning the quality or availability of various services and opportunities in your community. Do you consider them to be: poor, fair, good, or excellent?

(46 items: *e.g.*, availability of special education programs, availability of State parks, and quality of county and city law enforcement)

C. We would like to know how you feel about several questions of concern to State and local officials. For each statement, please indicate the extent to which you disagree or agree (strongly disagree, disagree, don't know, agree, strongly agree). There are no right or wrong answers, so feel free to express your own opinion.

(13 items: *e.g.*, a developer should pay the cost of water and sewer line extension to areas which he is developing; no one should be allowed to use his property in a way that might damage the property of others)

1975: ISSUES FACING KENTUCKY: WHAT'S YOUR OPINION? (KENTUCKY, N = 5,500) (14)

A. First we would like to ask you some questions about the community in which you live. * * * Here are some possible choices. Please circle the one which best shows how you feel about each problem, no (not a problem in your community), small, medium or serious (problem).

(65 items: *e.g.*, hospitals and doctors are too far away, inadequate fire protection, and not enough industry)

B. State and local governments in Kentucky spend tax money for many services and programs. Please circle the word that best shows whether you feel that more, less, or the same amount of tax money should be spent in the areas listed below. Remember, if you feel that more money should be spent on some programs and services, less tax money will have to be spent in other areas, unless taxes are increased (less, same, more).

(56 items: *e.g.*, building new streets and roads, mental health care, and salaries for public school teachers)

C. Here is a list of important issues which you and other Kentuckians might have talked about. We would like your opinion about each (yes, no).

(24 items: *e.g.*, should more of the Coal Severance Tax money be returned to the coal producing counties? Should government employees such as firemen and policemen be allowed to engage in collective bargaining?)

1976: YOUR OPINION OF DEVELOPMENT NEEDS AND CONCERNS FACING YOUR COMMUNITY AND MICHIGAN (MICHIGAN, N=22,000) (12)

A. Many communities face a series of problems for the people that live in them. A list of most of these problems is provided below for you. Using the following categories (not, slight, moderate, or serious) please indicate how you feel about the seriousness of each problem in your general community.

(55 items: *e.g.*, police-community relations, mental health and counseling services, and mobile home parks)

B. Local, State and Federal governments spend public tax money in many ways which affect your social well-being. Some of these ways are listed below. Please indicate whether you feel that no, less, the same amount, or more public funds should be spent in these categories.

(51 items: *e.g.*, development of tourist attractions, health and medical services, and purchasing new lands for public parks)

The issues on which people were asked to respond were also cast at a general level. In fact, most items were general enough that they could have been, and often were, identically stated in two or more of the surveys. The only exceptions to this phenomenon include the Pierce County Area survey, which was specifically prepared for that county based upon 2 years of preceding work by a Growth Policy Conference (11), and certain sections of the 1975 North Carolina (3) and Kentucky (14) studies.

Though I lack first-hand knowledge of the majority of these surveys, I believe it is safe to conclude that the primary source of questions for most consisted of previous surveys, as well as armchair reflection by researchers and their associates about what *seemed* to be major State and local issues. In some cases these sources were augmented by informal discussions and reviews of questionnaire drafts by agency officials and political leaders. But, in any case, the questions were not formulated on the basis of specific policy deliberations by decision-makers who would then look to the survey for results that would serve as one input to be articulated with others in order to carry on another round of policy discussions.

It seems to me that what these studies have done is to collect data with which a policy setting process could be started. Indeed, in some instances the surveys look very much like what we might expect at the first survey phase of a Model B survey process. The point remains, however, that they are as yet some distance from providing the kinds of preference information that is now within our technical capabilities to produce.

DOING MODEL B SURVEYS: AN EXAMPLE

A recent effort to set goals for the State of Washington illustrates a Model B approach to doing policy-oriented surveys of people's preferences. Called "Alternatives for Washington," it was initiated in January 1974 by the Governor. It was the Governor's intent that the directions set by these goals should guide the State government's program planning and provide criteria for making budget decisions. Space limitations make it impossible to adequately portray the complexity of this program, described in the *Futurist* as the most generously funded of more than a dozen State-level efforts of futures planning that have occurred across the United States (2, p. 265). Therefore, I will limit my discussion to the features most important for purposes of this paper.

The goal-setting process centered around a statewide task force of about 165 people, selected by the Governor from 4,000 nominees to represent all segments of the State's population. This group was given the assignment of producing alternative goals for the State. They met four times for three day workshops which consisted of classroom sessions, in-depth exchanges of information and perceptions, and futures-creating exercises. These "16-hour-a-day" sessions resulted in a large number of possible State goals being articulated and analyzed for the impact each would likely have on achieving the other goals. These activities were augmented by areawide meetings in ten geographic areas of the State involving another 1,500 people in similar though briefer futures-creating sessions. Following the area meetings, the State task force reconvened and finalized 11 alternative futures for the State and a very large number of specific goals.

The next activity was to present these choices to the people of the State. An intensive media campaign, which included weekly television programs, was produced for that purpose. This effort to "educate" the people of the State on the various choices was to be followed by a survey that would assess people's preferences. The plan was to provide the results to the State task force which would then use them as one input for deciding which choices to recommend to the Governor and legislature.

The questions to be included in the survey were developed through intensive interaction between the participants and the researchers. The researchers observed all sessions of the task force and attempted to convert the delegates' conclusions into questions that were suitable for surveys. The delegates, in turn, evaluated the extent to which they felt the intents of their alternative futures were captured by the questionnaires. Several iterations of this process were required to produce a satisfactory set of survey questions. The final questions varied from very general ones much like those contained in the surveys listed in figure 4, to some rather complex ones, of which the main example is the one on economic growth shown in figure 5.

FIGURE 5.—*Preference question from Alternatives for Washington Surveys*

Now we want to ask how you feel about *economic growth,* that is, the extent to which business and industry should grow and expand. This question is being asked in a special way. Under each choice are listed some possible results. These are consequences which, based on past experiences throughout the United States, seem likely to occur.

Q–13 Which rate of economic growth do you most favor for Washington?

(Put an "X" in box by your choice)

☐ Rapid Economic Growth, which may lead to these consequences:
  Considerable growth of *population*
  Considerable decrease in quality of the *natural environment*
  Considerable increase in *variety of job* opportunities
  Great need for new *energy sources*
  Family incomes increasing faster than the national average
  Rapid depletion of *natural resources*
  Very little *unemployment*
  More *public funds* to aid in solving social problems
☐ Moderate Economic Growth, which may lead to these consequences:
  Moderate growth of *population*;
  Some decrease in quality of the *natural environment;*
  Some increase in *variety of job* opportunities;
  Some need for new *energy sources;*
  Family incomes increasing about like the national average;
  Moderate use of our *natural resources;*
  Some *unemployment;* or
  A moderate amount of *public funds* for social problems.
☐ Slow or No Economic Growth, which may lead to these consequences:
  Little or no increase of *population*, possible decline;
  Very little decrease in quality of the *natural environment;*
  Little or no increase in *variety of job* opportunities;
  Little need for new *energy sources;*
  Family incomes increasing slower than the national average;
  Slow use of *natural resources;*
  Considerable *unemployment;* or
  A lack of *public funds* for social problems.
☐ I don't know which I prefer.

Q–14 Please look at the above question once more and indicate which of the possible "likely consequences" were *MOST* and *LEAST* important in making your choice. For convenience we have listed the areas of consequences below and identified each with a number.

☐ Put number of the most important consequence in this box.

☐ Put number of the least important consequence in this box.

Areas of Consequences listed above in question

1. *Population* consequence.
2. *Natural environment* consequence.
3. *Jobs* consequence.
4. *Energy* consequence.
5. *Incomes* consequence.
6. *Natural resources* consequence.
7. *Unemployment* consequence.
8. *Public funds* consequence.

Implementation of the surveys was further constrained by the requirement that they could not be started until the media campaign was concluded, but results had to be available within 1 month after that date. This very narrow time-window for doing the surveys was made necessary by a mandate placed on the task force that their final recommendations be available to the legislature when it convened early in 1975.

A full consideration of the constraints and the questions which the task force wanted to have answered by the survey led to doing four surveys rather than just one (13).

SURVEY	WHY?
1. Statewide survey of general public; sample of 1,000 people surveyed by telephone.	To get the quickest possible feedback to the task force, so they could start final deliberations.
2. Area surveys of general public: Sample of 500 people from each of 10 geographic areas which held meetings; done by mail.	To help delegates decide whether policy recommendations should vary by geographic area of the state. Greater length allowed more detailed questions to be asked.
3. Survey of all 165 participants in statewide task force; done by mail.	To get views of those who had "struggled" with the issues. Their opinions might be weighted more heavily on certain complex issues which general public might not understand.
4. Survey of all 1,500 participants in area conferences; done by mail.	To get area perspectives of group that had better understanding of complex issues.

The point of doing four surveys was not that one was better than any other. Rather it was so that each might complement the others, and contribute something the others could not. The mail and telephone methods were used because both could perform within the prescribed time constraints, at a cost that made it possible to get adequate numbers of responses for generalizing results to various subcategories of each population.

Results were presented to the statewide task force and its subcommittees as they became available. Appropriate cross-tabulations were included so that the views of particular sub-groups in the population (*e.g.*, high and low income people) could be examined. The influence of the survey results on the final recommendations of the task force was considerable, as evidenced by an examination of the final report (1). For example, recommendations concerning the rate of economic growth, land use policy, types of industries which should be encouraged to grow in the State, and priorities for the protection of the environment were direct reflections of the options most preferred by the survey respondents. In fact, charts citing the proportion of respondents supporting a particular position became one of the main pieces of supporting information presented in the report.

The design, execution, and use of these surveys conforms very closely to Model B. The decisionmaker in this case was the statewide task force. A series of "policy discussions" by this group preceded the surveys, and produced both the design and content. The surveys were very carefully timed so that the results would be available when the final policy decisions were to be made. In making those final decisions, the surveys constituted one of several pieces of information used by the group.

The recommendations of the statewide task force were used by the Governor, but in much the same way as results from Model A surveys often get used. Specific findings were used to justify proposed legislative actions. Policy recommendations were incorporated into the Governor's 1975 State of the State speech and integrated into 20 of the

30 pieces of legislation that he recommended to the Legislature in that year (2, p. 265). However, whether the task force recommendations were indeed the actual causes of his decisions or only "justifications," is something that perhaps only he knows.

Most important from the standpoint of being a Model B process, Alternatives for Washington did not stop here. A second phase was immediately commenced. This time, new task forces were formed for each of several issue areas identified in Phase I. They were formed in each of these areas: economic growth and population settlement, environmental protection and land use, natural resources and energy, transportation and communications, human development, education and training, and government. Members included technical experts from government and private industry as well as citizen representatives. These groups took the recommendations of Phase I as *working assumptions*, and then sought to specify the details of how those goals might be achieved, and the costs of doing so. The reports of these groups were then translated once more into questionnaires and surveys were conducted. These "hard-choice" surveys are just now being completed with the hope that more specific recommendations can be made to the Governor and Legislature. A fifth survey, just recently completed, is a replication of the earlier telephone survey done to find out if citizen preferences have changed in the 2 years that have elapsed since the first series of surveys.

Whether this round of surveys provides the more specific policy guidance hoped for, remains to be seen. Nonetheless, the entire set of Alternatives for Washington surveys demonstrates that it is possible to do surveys in relation to a policy process, making them an integral part of it.

CONCLUSION

Survey researchers can do a much better job of measuring people's preferences and bringing them to bear on policy decisions than we have done in the past. Until recently, we did not have any choice but to use the Model A approach I have described, despite its inherent inadequacies. We were captives of our methods, which simply did not mesh well with the unpredictable dynamics of the policy setting process. The development of reliable mail and telephone methods have freed us from those constraints, so that we can now do far more meaningful surveys following the Model B approach described in this paper. Although the Alternatives for Washington surveys must be considered a bit out of the ordinary because of the high political commitment that made those surveys possible, I believe they clearly illustrate the feasibility of doing Model B surveys.

Despite my enthusiasm, I believe it appropriate to conclude on a note of caution. Elimination of the technological barriers to doing Model B surveys does not suggest to me that we will see a great rush to do them. Survey researchers are not in the habit of subordinating their scientific endeavors to the actions of others, and in particular to something as unpredictable as a policy setting process. To do so probably means committing one's self to seemingly endless meetings, and a great deal of negotiation on when and how surveys are to be done. It means sacrificing the much prized ability to plan and execute a survey in one's own way. And, after having spent a year on the Alternatives for Washington surveys, I am convinced that a certain amount of tension between scientist and policymaker is probably inevitable.

However, it is not just the ways of scientists that stand as a barrier to doing Model B surveys. Policymakers will also have to learn new skills and adjust their ways of doing things. The notion of doing surveys on demand as a policy setting process unfolds is something that most have probably not experienced. To use surveys means figuring how to fit them into the policy process, and how to live within the scientific constraints inherent to survey methods. It means working our procedures for what to do with "peoples' preferences," after they get them. So long as the available preference assessments did not correspond very well to the policy questions, the survey could always be dismissed as invalid if for some reason they ran counter to an otherwise preferred policy option. I suspect some policymakers will find it quite threatening to have a survey on hand they feel to be quite valid, when all the other data they have suggest that to follow people's preferences would be an unwise choice.

If for whatever reason we continue to use our new tools in the same old way, thus sticking with our Model A approach, we will undoubtedly continue to produce survey results that policymakers find "interesting," and which they will "use." But, I suspect it will mostly be as window dressing for decisions and not as a significant input that helps shape policy decisions. However, if this does continue to be the case, it will not be because we are incapable of doing better.

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WHY DO WE NEED MULTIPLE INDICATORS OF PUBLIC SERVICE OUTPUTS?

[By Elinor Ostrom*]

The problem of measuring the output of local public agencies is closely tied to the problem of increasing the productivity of local public agencies. If productivity is defined as the quantity of output derived from a quantity of input, then both the output and input sides need to be measured if one is to compute this difference. The input side is *relatively* easy to compute. Labor, capital equipment, land, and other input resources come in relatively discrete units. Most of these units can be computed in terms of dollar costs so the aggregate effect of different combinations of input units can be determined.

The real crunch comes on the output side. What is the output of a police department, a welfare agency, a school system? Is there only one kind of output produced by such agencies? How do we measure what is produced by such agencies? These are the difficult questions around which this conference has been organized.

THE PROBLEM OF MEASURING PUBLIC GOODS

My own interest in this question arose several years ago from a theoretical problem. Most local government services can be characterized in theory as being public goods (3, 5, 6, 28). As such, once they are produced by an agency, they are simultaneously available to at least some group of people. The producing agency cannot exclude some individuals from benefiting from the service—even if they are unwilling to pay for receiving the benefit. This characteristic of local governmental services is what most frequently places such services in the public sector. Few private entrepreneurs are tempted to enter and produce goods and services for which they cannot receive payment from potential beneficiaries.

No Regular Information About Output

Given that the producer of such services does not engage in *quid pro quo*—something for something—relationships with beneficiaries, the producer has limited information about:

1. How much has been produced,
2. How much value consumers place on the goods and services produced, and
3. The preferences of consumers for more or different mixes of services.

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This lack of information about the nature of any agency's own output means that local governmental agencies are operating at a severe handicap when compared to private agencies producing and selling goods in the market (16). There are no *routine* transactions between producer and consumer that provide constant feedback of information to the producer about productivity or the demand for a product. Many transactions between public officials and citizen-consumers are either unrecorded or no consistent way exists for interpreting the meaning of these transactions.

Police interact, for example, with citizens in many unrecorded manners. While out on patrol, police are hailed by citizens to obtain information or to respond to potentially disruptive interpersonal situations. Unless requests for services are received by telephone, police-citizen transactions are infrequently recorded in any manner. Most "stop and frisk" operations leave no records of who was stopped and what was done. Even when records are made of interactions between police and citizens, it is impossible to give uniform interpretations to the meaning of the records as maintained. How do you measure the "output" of a call for service involving the request to help quiet a neighborhood fight?—to help a motorist get into his locked car?—to get a cat out of a tree?

Such records do provide the basis for "activity analysis." But, activity analysis goes back to the input side of the productivity equation. By careful use of internal records, one can gain some insight—and some quantitative measures of—the range, type and extent of activities engaged in by local public service agencies such as police, education, and welfare.[1] But, these measures are *not* measures of output—they do not provide information about the impact of the activities on citizens served nor the value that citizens give to their performance. Activities can be "counter-productive." In that case, the more that is done, the worse things get (16).

Reliance on Activity Records

Given that activity records are all the top executive of a local public service agency usually has to gain insight about an agency's producitivity, managers place heavy emphasis on activity records for establishing their productivity reports to local governing boards. Police annual reports are filled with data about number of miles patrolled, number of calls for service, number of arrests made, number of traffic tickets issued, number of fingerprints processed, etc. Such reports leave to the city-manager or mayor, the city council and the citizenry at large the necessity of translating these activities into some form of output and evaluating performance.

Without measures of output to compare with activity records, no one can precisely evaluate the productivity of a local government agency's efforts—neither those at the head of the agency, nor elected officials of a city, nor the citizens. In relatively small communities, officials are *also* citizens of a community. As citizens they receive the services of their own agency. They can thus evaluate service levels in their own community on a first-hand basis. If all local governments were relatively small, some of our problems of measuring the output of local public service agencies would be less severe. While the detail of public reports is frequently less in smaller communities, operating heads, local public officials, and citizens can all gain considerable information from their own experience about service levels in the community. However, in very large cities, no official can gain *first hand* information about how services are being performed in different neighborhoods in the city. Officials are dependent to a much larger degree on the *reports* provided them about productivity. If these reports contain no measures of output, then they know *only* about inputs. Decisions can be made which increase nonproductive activities.

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[1] Many agencies do not even make full use of the activity records which could easily be converted into important internal reports. For a discussion of the loss of information about the large volume of service calls and activity level resulting from a police department's primary reliance upon the F.B.I. Index Crimes, see Parks (24).

EMPIRICAL EFFORTS TO MEASURE OUTPUT

This theoretical interest in the problems of measuring output—particularly in large cities—led members of the Workshop in Political Theory and Policy Analysis at Indiana University to undertake a series of studies which have attempted to measure the output of local public agencies.

Police

Our first studies compared levels of service outputs for large and small police departments serving relatively similar neighborhoods within a single metropolitan area (10, 14, 17, 19, 21, 23, 27). Our substantive interest in this resulted from the repeated assertions that small-scale police agencies were less effective than large-scale police agencies. These assertions underlie the recommended standards adopted by national and State standards and goals commissions (13). The Michigan Advisory Commission on Criminal Justice has, for example, just adopted the following standard:

> Local government should be encouraged to maintain, through consolidation if necessary, law enforcement agencies containing no fewer than 20 sworn officers who are involved in the delivery of police services (12).

While asserting that the levels of productivity among small police departments are inadequate, none of the commissions recommending the elimination of these small departments have cited evidence to support the assertion that productivity will increase by following their recommendations.

Types of Measures Used.—In our attempt to examine these assertions empirically, we utilized a series of measures derived from citizen surveys. The first type of measure was that of citizen experiences with crime and with police. These included:

Whether anyone in the household had been the victim of criminal activity?

If a victimization incident had occurred, were the police notified?

If notified, how fast the police had responded?

If the police responded, what level of activity was undertaken?

Whether anyone in the household had called upon the police for assistance to deal with a noncriminal, but emergency problem?

If assistance were requested, how fast did the police respond?

If assistance were provided, what level of activity was undertaken?

Whether respondents had been stopped by police serving their neighborhood?

Whether respondents knew anyone who had been mistreated by police serving their neighborhood?

Secondly, we utilized a series of indicators of citizen *evaluations* of service levels. These included:

How fast respondents thought police serving their neighborhood responded?

Whether respondents thought crime in the neighborhood was rising, about the same, or decreasing?

Whether respondents thought that police-community relations were outstanding, good, fair, or inadequate?

Whether respondents thought that the job performed by police serving their neighborhood was outstanding, good, fair, or inadequate?

Whether respondents thought that police services were equally available to all in their community?

We expanded this list of measures derived from random samples of citizens being served by varying sized departments with further measures derived from interviews with police and from other agency records (2, 9). These included:

The evaluation given by officers to the performance of their own police department.

The ratings given to the departments in the area by a pool of police officers serving a metropolitan area.

The proportion of warrants issued by the prosecutor to warrants applied for.

Findings.—Using these multiple measures of output in a series of studies conducted in Indianapolis, Chicago, and St Louis and replicated in Grand Rapids and Nashville-Davidson County, we found a consistent pattern *across* indicators of output (10, 14, 17, 19, 21, 23, 27). Increases in size of police agencies serving similar neighborhoods did not increase productivity. Small departments performed either at equal or higher levels across the range of all indicators used. Having used the series of different indicators, we can make much more confident statements about the relative productivity of large and small police departments than if we had used a *single* measure of output.

Primary Reliance on One Mode of Data Collection.—However, many of our individual measures of output were derived from one *mode* of data collection—that of individual interviews with respondents selected by a random process. Many scholars and public officials are uneasy about *any* reliance upon data collected about public agency performance from a survey of citizens. Citizens are thought by some to be uninformed and unable to give reliable perceptions and/or evaluations of service levels.

This challenge to a particular mode of data collection about the output of public agencies led us to design a study in which multiple measures of output were obtained from multiple *modes* of data collection (8, 15). We wanted to compare the similarity of data collected from three modes: citizen interview, physical measurement devices, and agency records. The latter two modes of data collection are considered by many as "objective" data while interview data is considered "subjective." With such comparisons we could ask, for example, whether the pattern of service delivery as perceived by citizens was similar to that measured by some form of physical device or by agency records. We sought to determine whether "subjective" measures are related to "objective" measures.

Road Repair and Street Lighting

While one can talk about "physical" measures of output for local public services, there are few services for which one can "dream up" a way of physically measuring it, let alone having a measurement device already available. We finally selected two service areas—road repair and street lighting—where we thought we could develop physical measures, gain information from a random sample of citizens, and obtain information from agency records concerning levels of output. The Urban Institute had already undertaken some work in the area of measuring road roughness using a "roughometer" and the idea of measuring street lighting by a light-meter seemed feasible.

Types of Measures Used.—This project took us far astray from social science into the realm of physics, optics, and mechanics. We learned that developing valid and reliable physical measures of output—even for such relatively simple and clear cut services as road repair and street lighting—is not easy. For street lighting, we developed a method to utilize a precision light meter to record the level of night lighting on sidewalks and streets facing a particular blockface (26). For street repair, we developed a mechanical device, called the residential street roughness indicator, to measure the roughness of residential streets (25). In addition, we also developed an observation form and procedure which can be used by trained observers to record specific data about various aspects of street conditions. The procedure includes measuring all potholes on a blockface with "yardstick pothole measurer."

A survey represented our second mode of data collection. A pretest of our survey instrument was administered to respondents living in seven neighborhoods in Indianapolis during 1974. A total of 326 respondents were interviewed in this test. Citizens were asked a series of questions to elicit their *perceptions* of street lighting and road repair, their *evaluations* of the same, and their *preferences* for different levels of these services.

Agency records were to be our third mode of data collection. Unfortunately, we found this mode of data collection to be the most difficult of all. Agency records were so fragmentary that few consistent indicators could be developed. For road repair we were able to code the frequency of complaints directed to the Indianapolis Department of Transportation concerning the roads facing the respondents in our survey. For street lighting, we were not able to code much more than the frequency and pattern of street lights shown on agency maps.

Preliminary Findings.—Preliminary data analysis has been initiated. One of the first questions we have addressed is "What is the relationship between citizen perceptions of service levels and our physical measures of service levels?" This is a particularly important question since many policy analysts are hesitant to rely upon citizen-reported evaluation of output due to the assumed inaccuracy of citizen perceptions of service levels. Early analysis does not provide a completely uniform picture of accurate perception across all indicators. However, the more specific and concrete the referent to which our questions were addressed, the more likely a high level of association exists between physical measures and citizen perceptions of service levels.

For example, citizens generally were quite accurate in their perceptions of specific aspects of road repair on their block. Citizens accurately reported the type of street surface, the presence or absence of curbs, the condition of their curbs, the presence of surface disintegration, and the presence of potholes (4).

Sue Carroll of the Workshop staff developed a roughness scale composed of individual items derived from our observation procedures (4). The scale was developed for each quadrant of a blockface and for an entire blockface. The scale included the observer's coding of the amount of surface disintegration, the number and size of potholes, the presence or absence of bumps and the presence or absence of utility cuts. Each observer was also asked to rate each blockface as being "very rough," "fairly rough," "fairly smooth," and "very smooth." These observer ratings were strongly related to the physical "roughness scale" for both a quadrant (gamma=0.94) and for the blockface as a whole (gamma=0.97). Given these high coefficients, the roughness scale derived from individual items coded by observers would appear to have at least some validity.

When respondents' perceptions of the roughness of the street on their block were then associated with the quadrant and blockface roughness scale, the measure of association between them is fairly strong (gamma=0.76 for both scales). As shown on table 1, some variation occurred across various control variables. Those persons with more than a high school diploma, those over 45, those who lived on a block more than 5 years, and those living on medium to short blocks tended to be more "accurate" in their perceptions of road roughness. Initial data analysis with scores produced by the residential street roughness indicator device are consistent with these findings. A high association exists among all these individual modes of data collection concerning the level of road roughness. The perceptions of citizens, the output from a mechanical device for measuring road roughness, and the coded observations of trained fieldworkers are positively associated.

Although the levels of association are not, in general, as high as in the case of street repair, statistically significant correlations between citizen perceived streetlight brightness levels on their blockface and data from a precision photoelectric meter were found (7). Further, a distinct pattern emerged between the strength of association and the distance on either side of a respondent's house over which light meter readings were averaged. Correlations reach a maximum when meter readings are averaged over intervals relatively proximate to a respondent's home and decline as the meter readings are averaged over widening intervals.

The lowest correlation is between citizen perceptions of streetlight brightness and light meter readings averaged for an entire blockface. For some subsets of the sample, this correlation was not statistically significant. Citizens, thus, appear to show a pronounced tendency to

TABLE 1.—MEASURES OF ASSOCIATION BETWEEN CITIZEN PERCEPTIONS OF ROUGHNESS AND SCORES ON BOTH THE QUADRANT AND THE BLOCKFACE ROUGHNESS SCALES

	Sex		Education			Age	
	Females	Males	Less than high school graduate	High school graduate	More than high school graduate	Less than 30 yr old	30–45 yr old
Entire sample:							
Gamma=0.76	0.74	0.78	0.73	0.69	0.85	0.68	0.61
N=(247)	(142)	(102)	(82)	(77)	(80)	(80)	(66)
Gamma=0.76	0.71	0.81	0.72	0.71	0.80	[1] 0.67	
N=(319)	(183)	(132)	(99)	(106)	(106)	(190)	

	Age		Length of residence		Length of blockface		
	46–60 yr old	More than 60 yr old	Less than 1 yr/1–5 yr	More than 5 yr	Short (650 ft)	Medium (650–900 ft)	Long (900 ft)
Gamma=0.76	0.87	0.93	[1] 0.66	0.89	0.81	0.85	0.44
N=(247)	(57)	(44)	(126)	(121)	(74)	(79)	(74)
Gamma=0.76	[1] 0.89		[1] 0.67	0.87	[2] 0.91	[2] 0.69	[2] 0.69
N=(319)	(129)		(160)	(159)	(100)	(101)	(118)

[1] Because of the nature of the distributions, there were too few respondents to compute gamma for these categories separately. Therefore, 2 categories have been combined.

[2] Even by combining these 2 categories, there were so few respondents with scale scores in the "very rough" or "fairly rough" categories that gamma could not be computed. Therefore, the scale was dichotomized into "rough" and "smooth" and Yule's quotient was computed.

Source: (4, p. 28)

perceive blockface streetlight brightness conditions in terms of the brightness levels relatively proximate to their own homes. When asked specifically about conditions near to their homes, citizens are more accurate. We found that citizens who had lived on their block for more than 10 years, who had a high school or better education, or who lived on relatively short blocks showed a higher than average degree of accuracy.

SIGNIFICANCE OF FINDINGS FOR OTHER SERVICE AREAS

Ascertaining the Least Expensive Valid Measure of Output

The finding that measures derived from interviews with citizens and measures derived from physical devices or field observation forms are positively related for two service areas has considerable importance for those interested in measuring the productivity of local public service agencies. In the first place, given the close association between the diverse modes of data collection regarding road repair, public officials or public interest groups concerned in ascertaining the relative productivity of agencies engaged in road repair activities can select the mode of data collection which is least expensive. The results obtained will correlate highly with results obtained from more expensive modes of data collection. Thus, we can increase the productivity of measuring productivity! Of the three modes of data collection compared—the residential street roughness indicator, the field observation form and the citizen survey—the field observation form is the least expensive mode of data collection.

The Workshop in Political Theory and Policy Analysis has prepared a portfolio of professional papers on "Multiple Measures of Municipal Output." The portfolio contains a copy of the road repair observation form and an instruction booklet on the procedures for using this form. Copies of the citizen survey related to road repair and drawings of the residential street roughness indicator are also included for those who wish to utilize the other modes of data collection or to further experiment with simultaneous collection of output measures with more than a single mode of collection. The portfolio also focuses on the measurement of streetlighting including a citizen survey, field procedures for utilizing a precision light meter and descriptions of two instruments we utilized in our citizen survey—a street lighting simulator and a street lighting photograph display.

Citizen Perceptions of Specific Service Attributes Relatively Accurate

The findings from these studies are important also for those areas where no physical measures of output are possible. Given that citizens seem to be fairly accurate in their perception of specific and clearcut attributes of road repair and street lighting, one can have somewhat more confidence that citizens will be fairly accurate in their perception of specific attributes of other services. To the extent that questions can be phrased about specific aspects of services for which there are no physical measures of output, it would appear that one can obtain fairly accurate perceptions from citizens.

This means that considerable attention must be paid to the construction of questions on citizen surveys. We found, for example, in our early pretesting of our police-services instrument that asking the question: How fast did the police arrive? (to a person who had been a victim of crime and had called upon the police) was not specific enough. Many respondents indicated only "very fast" or "slow." We then found that some people thought "slow" was 10 minutes while others thought "slow" was 30 minutes. Given this information from our pretests, we obtained data about response time in terms of minutes elapsed between call and response.

The focus of this paper has been on the measurement of the output side of the productivity equation. It is indeed the most difficult problem in determining the relative productivity of different public agencies. Many scholars have "thrown up their hands in dispair" and assumed that measuring outputs of public services was impossible. This has, at times, led them to utilize expenditure data as measures of output. The relative productivity of different agencies can *never* be determined if input measures are used as output measures. While the problem of measuring output is indeed difficult, the development of multiple measures of output derived from one or more modes of data collections seems our only route in understanding productivity we can then examine the pattern of results across indicators.

However, to assess productivity, we do indeed need to measure the input side and relate inputs to outputs. Empirical examination of productivity should be related to theory in the sense of identifying the factors we presume to make a difference in affecting productivity. Some of these factors relate to organizational variables such as the size of a jurisdiction, degree of overlap, level of cooperation, etc.[2] Other factors relate to money, personnel, and technologies used in particular production processes. As we examine the comparative productivity of different types of public agencies, we should derive hypotheses about *what* different factors are expected to make a difference in the productivity of public agencies. Then, our research efforts can secure evidence to reject hypotheses which are not supported and to increase the warrantability of those which are supported.

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[2] It is these factors that have been the focus of our own studies. These are the "institutional" variables which are frequently the subject of change by policy makers who wish to improve the productivity of operations by local government agencies.

Most of our presumptions about the factors likely to increase productivity of public agencies have *not* been subjected to empirical test. They are accepted as part of the conventional wisdom. However, many of the findings in our current research about comparative levels of productivity run contrary to conventional wisdom (10, 11, 14, 17, 18, 19, 20, 21, 23, 27, 29). A surprising number of studies indicate either no significant economies or substantial diseconomies to be associated with increased size of public service agencies (1). Yet these findings are often ignored as though we should not be confused by the facts. When presumptions which are assumed to be true are not supported by empirical evidence, we are confronted with the serious task of rethinking our presumptions and of developing alternative explanations for why we get the results we do (19). The crisis of confidence that pervades much of American public life calls for more than productivity measures. But productivity measures are key elements in our efforts to explain why we often get such poor results with such lavish efforts.

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ASSESSMENT OF HEALTH CARE QUANTITY AND QUALITY

[By Patrick O'Donoghue, M.D.*]

INTRODUCTORY POINTS

Since the special papers in this Conference are intended to be partially reactive in nature, this presentation will begin by emphasizing and largely seconding three points made by Elinor Ostrom in her major paper (20). The first is the *avoidance of input measures to assess output or quality.* Unfortunately, while input measures have been infrequently used to assess output in the health care field, they have often been employed to indicate quality. For many years it was a common practice not only for policymakers and regulators, but also for researchers, to assess hospital quality in terms of such input variables as the ratio of registered nurses to admissions or patient days, or the ratio of all nursing personnel to admissions or patient days. The Joint Commission on Accreditation of Hospitals, a private regulatory body,[1] has traditionally employed a diversity of input measures in its work, although its approach is now changing to some extent. The quality of nursing homes is still primarily assessed in terms of the ratio of registered nurses or all nursing personnel to average patient census. In the development of the Federal Health Maintenance Organization (HMO) Act of 1973 (Public Law 93-222), an important issue was whether HMOs receiving support under the Act should be required to have minimum ratios of physicians, nurses, and/or equipment to enrollees.

Quality assessment in terms of input measures does have advantages from a regulatory viewpoint. This is especially true if it can be established that a basic set of inputs makes an entity a particular "something," such as a hospital or a nursing home. In this instance the input measures can be used to define the institutions that will be reviewed by a regulatory body or subject to a specific set of laws. Equally important, input measures of this type can be used to prevent fraud since they can be specified as entry conditions. Even in this regard, however, caution must be exercised in order to prevent industry/government collusion from using such input measures to unduly block entry.

The major deficiency in using input measures to assess quality is that by definition a tautology has been established in which high quality is equivalent to high cost and low productivity. For example, if the ratio of nursing personnel to admissions is used to assess hospital quality, and if hospitals are thus encouraged to increase this ratio, the mirror image productivity measure of admissions/nursing personnel will perforce fall. Similarly, if hospital quality is assessed in terms of the breadth of facilities and equipment, hospitals are given an incentive to increase their capital inputs and lower their capital productivity.

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[1] It operates under the joint sponsorship of the American College of Surgeons, the American College of Physicians, the American Hospital Association, and the American Medical Association.

The second point is the *use of multiple indices to assess output.* I concur with this recommendation not because it is desirable, but rather because it is necessary. The nature of the outputs for most public and social services mandates the use of multiple indices. That is, it is often true that individual outputs cannot be accurately summed into a single measure. If such were possible, a single index would be preferable. Additional measures which have little explanatory or distinguishing power are confusing to both policymakers and researchers. For example, it is customary to measure and aggregate cost in terms of dollars, and this approach has proved satisfactory from both research and policy perspectives.

In a sense, this point is a recognition of the obvious, and of what we began with in this conference, *i.e.*, the difficulty of measuring outputs. However, it also means that it is incumbent upon the analyst to search for a single best index (or indices) and to delete superfluous ones. In our experience, the analyst should begin with a wide net of possible indices, then carefully but rigorously prune those indices.

The third point is that *multiple methods of data collection and index construction should be employed in evaluation work.* Such an approach is expensive, and it is consequently impossible to employ it in all studies and certainly not in all routine evaluations. Nonetheless, utilization of different measurement methodologies is essential to continued progress in evaluation work. This is so not only because such an approach provides multiple perspectives on the same question, but also because comparison of different methodologies may identify cost-ineffective techniques. Equally important, more expensive and complex methodologies which are substantively sound can be used to validate techniques which are less costly and cumbersome, but also substantively less sound without such validation. Thus, usage of multiple measurement methodologies can improve the efficiency of the evaluation process and consequently bring targeted evaluation efforts closer to the reach of smaller governmental units.

HEALTH CARE QUANTITY MEASUREMENT

The remainder of this paper will be devoted to its principal subject—the assessment of health care quantity and quality—and will employ the acute short-term hospital as the subject to illustrate the points made about both quantity and quality measurement.

The hospital sector is the largest component of the health care industry. The hospital itself is a complex institution and thus graphically demonstrates many of the problems of quantity and quality measurement. In part because of these characteristics, analysts have devoted more attention to the hospital sector than to most other health care sectors. Thus, more progress has been made in quantity and quality measurement. Like most health care sectors, the measurement of hospital quantity and quality is important in both rural and metropolitan areas. Moreover, most of the points made about the hospital sector are also applicable to other health care sectors.

The basic problem with measuring health care quantity is that the output of this industry is not homogeneous. Like other industries, it does not produce the precisely similar "widgets" that are described in economic literature. Instead, its products are bundles of services which are to some extent unique to each case.

Two units have generally been used to measure hospital output. One is *admission*, which is generally defined as all hospital admissions, including patients who subsequently die but excluding transfers among hospital units. The other is *patient day*, which is customarily defined as the presence of a patient in the hospital for a day. It is generally preferable to exclude newborn nursery and skilled nursing facility utilization from both output measures. Most health care researchers, including our group, prefer the admission to the patient day as the primary measure of the quantity of hospital care. The rationale is that the admission is a more discrete output than the patient day. For example, the main unit consumed or provided is the gall bladder removal, the normal delivery, or the admission for kidney infection, rather than the individual patient day for any of these conditions.

Neither the admission nor the patient day by itself is a sufficient measure of hospital output because of the heterogeneity of that output. It is consequently necessary to take into account other characteristics of hospital output. Further, once such characteristics are taken into account, the results are highly similar whether the admission or the patient day is employed. For example, in several of our studies essentially the same findings were obtained regardless of whether cost/admission or cost/patient day was used as the dependent variable in regression analyses.

One of the hospital characteristics first considered in the attempt to better define hospital output is *service mix*, *i.e.*, the mixture of services offered by the hospital.[2] One of the reasons this factor was employed was the apparent ease of its measurement. For a number of years the annual hospital survey conducted by the American Hospital Association has reported on a simple present/absent basis the array of a hospital's services. However, service mix as reported by this data source was found to be not entirely satisfactory since the dichotomous method of measurement does not take into account differences in the intensity with which a service is provided.

A more serious defect is that service mix is still partially an input measure. While it is likely that service mix has a positive influence on hospital costs, this factor is not a measure of services provided, but rather of services offered. Uneasiness about this inherent property of service mix led analysts to search for better definitions of output.

In this regard several avenues were pursued. The most fruitful focused on the question: if the admission is the unit of output, and if a hemorrhoidectomy is different from a heart attack, then why not categorize admissions in terms of different types of cases? The exploration of this question led to the recognition that probably the most important factor to take into account in characterizing hospital output is *case mix*, which is defined as the mixture of the hospital's cases in terms of diagnostic or operative cohorts (*e.g.*, pneumonia, psychosis, appendectomy, or repair of fractured hip).[3]

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[2] A number of authors have linked service mix to hospital costs and other characteristics. Among the earlier investigators to emphasize service mix were Berry (1), Carr and P. Feldstein (4), Choen (5), and Francisco (13). In the Indiana project, the Colorado study, and the Metropolitan Area study, our organization has constructed and utilized several service mix indices designed to represent the breadth of services offered by the hosptial.

A number of approaches have been used to measure case mix. Cases have been substantively grouped either for tracer indices or for measures intended to directly capture the majority of hospital output. Principal component analysis and other types of statistical techniques have also been used to aggregate hospital cases. Another technique which we have found promising in our recent work is to construct a case mix index which is analogous to a Laspeyres-type price index.

In our experience, the key element in all case mix index construction, regardless of the specific techniques employed, is the careful characterization of each individual case cohort, so that each is relatively homogeneous in terms of the purpose of the overall case mix index. For example, if the overall index is to be used to predict hospital costs, then a strong effort should be made to define each case cohort in such a way that the cost/case within the cohort is unimodal. A good illustration of a unimodal cohort is inguinal herniorrhaphy (without obstruction). There is no substantive reason to expect this cohort to consist of two distinctly different types of cases. In contrast, the cohort of gall bladder disease encompasses both patients admitted for several days during an acute episode, and patients definitively treated with operative removal of the gall bladder, for whom the length of stay is frequently 10 days.

The limitations of specific data sources may, however, make it impossible to be fully satisfied that the cohorts included in the index are unimodal. This problem was encountered in one of our recent projects. To partially circumvent it, a *case severity* index was created. The purpose of this index was to measure for selected case cohorts both the inherent seriousness of the case and the predominant nature of the services provided. That is, this index is used to measure differences in severity in those cohorts in which bimodality is expected. Length of stay is employed as the indicator of such bimodality. Hence, it is crucial to the construction of this type of index to be able to specify on substantive grounds the case cohorts for which the primary variation in length of stay is probably due to differences in case severity, rather than to differences in style of practice.

Style of practice is defined by us as the customary length of stay prescribed by physicians for similar cases. It does not usually vary significantly across a single State, but it appears to differ substantially across different regions. The reason is that style of practice is primarily determined by dominant physicians in a region and by major medical education programs serving the region. The inguinal hernia cohort cited above is a good example of a case mix group in which length of stay is likely to be primarily determined by style of practice, while the gall bladder disease cohort is illustrative of those groups in which length of stay is predominantly influenced by case severity.

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[3] Analysts who have been important in the characterization of case mix are M. Feldstein, *et al.* (10, 11); Lave, *et al.* (14, 15); Rafferty (21); and Fetter (12), Thompson *et al* (23). The development of case mix and related indices is also a major focus of our Indiana and Colorado projects.

Another factor which is important in defining hospital output is *patient mix, i.e.*, the mixture of cases in terms of patient characteristics. Age is the patient characteristic which has been most commonly used in this regard. The most important age dimension is usually the percentage of the hospital case load which is elderly (*i.e.*, aged 65 or more). However, our group and others have employed additional age variables, such as the percentage of patients under 5 years of age and the percentage of patients aged 51 through 64. Other patient characteristics, such as race and sex, have also been included in hospital analyses, but not as frequently as the age variables.

HEALTH CARE QUALITY MEASUREMENT

In the health care area a strong paradigm has been developed for categorizing quality measures.[4] This paradigm is especially important since it would appear to be applicable beyond the health area. To illustrate this point, not only will hospital examples be given in this section, but also examples drawn from the police area, one of the sectors discussed in Dr. Ostrom's paper. Since our substantive experience in the police area is less strong than that in the health care area, the examples for the former will be specified in more general terms than those for the latter.

A major premise of the current approach to health care quality assessment is that there are four general types of quality measures. The first is *input measures*. These measures are directed toward the question: is the application of inputs sufficient? The strengths and weaknesses of these measures have already been pointed up. As also noted earlier, input measures have been extensively used in the health care area.

The second type of quality index is the *process measure*. The purpose of this measure is to determine whether the "right" procedures were performed. Examples of such measures in the hospital area are the percentage of appendectomies with a complete blood count; the percentage of heart attack patients with serial electrocardiograms; the percentage of peptic ulcer patients receiving only one unit of blood; and the percentage of gall bladder removal patients over the age of 40 who receive an electrocardiogram. Possible process measures in the police sector would appear to be the percentage of police calls in which violence is a possibility, which are answered within x minutes, or the percentage of alleys patrolled at least every y minutes.

At least in the hospital area, data sources amenable to process measure construction are frequently available. Another advantage of process measurement is that hospital quality can be evaluated at a point in time relatively close to the time period when the care was delivered. Hence, if deficiencies are found, they can be addressed before a large amount of low quality care is provided to consumers.

The major weakness of process measures is that they are heavily dependent on existing wisdom, *i.e.*, on the so-called present state of the art. Consequently, it is possible (and perhaps probable in some instances) that individual process measures or a whole battery of process measures have little relationship to the effectiveness of health care. By extension, process measures, like input measures, may lock in existing techniques which are inefficient, ineffective, or both.

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[4] A number of investigators have played an important role in the development of this paradigm. Among them are Donabedian (7, 8), Brook (7, 3), Williamson (24), and Ellwood *et al.* (9). In addition, our Indiana project will feature the assessment of hospital quality across a large number of hospitals. The assessment of health care quality was also addressed in our earlier work on the effects of health care regulation.

The third type of quality index is the *clinical outcome measure*. It asks the question: what was the outcome of an episode of care? For example, what was the recurrence rate for inguinal herniorrhaphy? What percentage of patients treated for urinary tract infection had recurrent infections 6 months later? What percentage of heart attack patients hospitalized for more than 2 days died? Possible examples in the police area would be: did a traffic control program reduce speeding in a particular area? And, did a program of increased police patrol result in decreased burglary and robbery rates?

Clinical outcome measures are closer to the bedrock quality issue, *i.e.*, the impact of health services on health status. Further, they have been employed successfully in several experimental studies. However, few existing data sources contain information which can be used as the basis for clinical outcome indices. Each application of such measures hence requires primary data collection and is thus generally more expensive than the usage of process measures, and especially input measures.

Another point is that health care cannot be assessed in terms of clinical outcome measures until a significant period of time after the delivery of care, although this lag period is not extremely long for most such measures. From a regulatory viewpoint this time delay may thus create problems, but from an evaluation perspective it is usually acceptable.

The fourth type of quality measure is the *health status index*, which measures the health of a population. Mortality and life expectancy rates are examples of health status measures. Equally important, and generally more useful for evaluation purposes, are morbidity measures, such as school days lost, days off work, and days of restricted activity. Several specific measures of this type are mentioned in the paper prepared for this conference by Cordes (6). The analogous indices in the police area are measures of the crime status of the population. Although the validity of crime status indices has at times been questioned, they have been utilized in policy-oriented work.

As might be expected, health status measures stand at the opposite end of the spectrum from input measures. Their strength is that they are a direct measure of the health of a population. Hence, they can be employed to answer the fundamental question: what is the impact of a specific program on health? However, they are expensive and cumbersome to use, since in most instances it is necessary to mount a major data gathering effort in order to obtain sufficient health status information. Further, it is frequently difficult to link the effect of a particular program to health status. Although the program may affect enough individuals to be cost-effective, it may not influence the health of a sufficient number of individuals to impact the health status of the entire population. Another weakness in health status indices arises from the frequent necessity of assessing health status substantially after the fact. That is, an effect on health status might not be anticipated until perhaps 5 to 10 years after the initiation of a specific program. This may be simply too long to wait for evaluative feedback.

As a consequence of these weaknesses, health status measures have rarely been successfully employed in an evaluative study. However, it is possible that this may change in the future since substantial progress has been made in health status index development during the last decade.

This framework of health care quality measures brings us back to a point emphasized early in this paper—the value of utilizing multiple measurement methodologies. Most nonmetropolitan (and metropolitan) communities cannot afford to use health status measures in evaluative efforts. Further, for the reasons noted above, health status measures may be inappropriate for specific program evaluation. However, they may serve the important function of validating clinical outcome measures which can then be used in program evaluation. The rationale is that health status measurement can provide significant insights about which types of clinical outcomes are likely to impact the health of the population.

Similarly, clinical outcome assessment can validate process measures by indicating which processes have a significant influence on the outcomes of similar episodes of illness. Such a step is desirable since the routine application of process measurement is less expensive and can be undertaken more concurrently than clinical outcome assessment.

SUMMARY

Three points made by Dr. Ostrom in her paper deserve emphasis. The first is the avoidance of input measures for assessment of either quality or output. The second is the necessity of using multiple measures of output and quality, although I would also stress that a systematic effort should be made to develop the single best measure(s) of the specific characteristic being assessed and that, correspondingly, measures of marginal importance should be deleted. The third is the synergism among multiple measurement techniques.

The hospital is employed in this paper to illustrate techniques for measuring health care quantity and quality. The admission or the patient day has been used as the basic measure of the quantity of hospital care. In our experience, preference should be given to the former since it is a more discrete output unit. Case mix is the most important characteristic to take into account in further characterizing hospital output. In some instances it may prove necessary to use case severity indices as well as case mix measures. It is also important to take into account patient characteristics, especially age composition. Service mix was initially used to characterize hospital output. However, it is less satisfactory for this purpose than the measures noted above.

A paradigm has been developed which specifies that there are four general types of health care quality measures—input, process, clinical outcome, and health status indices. This conceptualization is useful since it would appear applicable not only to health care, but to public and social services generally. That is, the overall strengths and weaknesses of these different types of measures will be present across a series of different fields. Their strengths and weaknesses also illustrate the advantages to be gained from multiple measurement techniques.

It is appropriate to close this paper on an optimistic note. It is true that ideal measures of quantity and quality have not been developed in the health care field. However, it is equally true that substantial progress has been made in index construction during the last 20 years. Output and quality indices are significantly more comprehensive and sophisticated than they were in 1957. As a result, they are significantly more accurate and thus more capable of providing effective evaluative feedback.

Equally important, the issues which underlie health care output and quality assessment are much better understood now than they were 20 years ago, or even a decade or 5 years ago. This increase in knowledge thus provides a solid base for the future development of output and quality measures.

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THE QUALITY OF SOLID WASTES AND FEASIBILITY OF PARTIAL OR TOTAL RECOVERY

[By Kenneth C. Clayton and Joseph Havlicek, Jr.*]

Of the many services provided by the public sector, several involve a materials flow. For this latter class of services an added dimension becomes important. Specifically, attention must also be focused upon the physical throughput itself. Of particular interest are any relationships that might exist between the types of materials handled and the management options available.

One such service characterized by a materials flow is solid waste management. Solid waste consists of the residual materials from the daily consumption and production that takes place in a community's residential, commercial, and industrial sectors. Management of these residuals has become an important issue in urban and nonmetropolitan areas alike.

This paper opens with a general discussion of quality dimensions as they pertain to the management of solid waste. Research on the quantity and composition of household solid waste as a quality dimension is then reviewed. Implications of this research particularly as they relate to resource recovery are presented next. Finally, consideration is given to alternative organizational arrangements for waste management systems in nonmetropolitan areas.

Solid Quality Dimensions of Solid Waste Management Services

The concept of quality as it relates to solid waste management assumes several dimensions. From a consumer standpoint, quality is perceived largely through contact with the system. This usually means evaluation of the collection activity. Such factors as frequency of collection, types of solid waste accepted, curbside versus backyard pickup, noise, damage to containers, and required separation of particular materials (*e.g.*, aluminum cans or newspapers) are all quite important.

Collection is but one of several activities that are included in a solid waste system, however. Equally important in many systems are transfer, intermediate processing, recovery, and disposal. Various quality measures can be assigned to each of these activities. One such measure is in terms of system externalities. Externalities are defined as the spill-over effects from a given activity for which compensation is neither paid nor received. Quality is inversely related to the severity of any adverse externalities. The greater the odor, the dust, the noise, the traffic congestion, and so forth, the lower the quality of the system

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in question. Havlicek, Richardson, and Davies (9), for example, have shown that the price of residential property in proximity to solid waste disposal sites is adversely affected depending on distance away, angle downwind, and type of disposal technique being used.

A slightly different concept of system quality is possible, too. Public health and environmental concerns dictate certain minimum levels of solid waste service. Collection must be performed at regular intervals, for instance, just as solid waste at sanitary landfills must be covered periodically. Increments above these basic levels of service might be viewed as higher quality (7). This concept of quality can be directly related to that of the consumer if the added increments in service occur as more frequent collection or some other perceivable change.

One further concept of solid waste system quality is related to the broader question of materials conservation. As Boulding (2) has observed, we inhabit the "spaceship earth" with its finite supply of resources. Quality in this context actually involves two dimensions: (a) quality of the solid waste *input* (composition and quantity) that is available for recovery and (b) quality of the *output* (quantity and marketability) that results from a recovery-based solid waste system. Both dimensions obviously relate directly with the materials throughput characteristic of solid waste service.

The remainder of this paper is directed at the concept of solid waste quality as it relates to a materials conservation objective. The input dimensions will be discussed first to be followed by considerations pertaining to the output dimension.

COMPOSITION AND SEASONALITY OF HOUSEHOLD SOLID WASTES

The results from research on the composition and seasonality of household solid wastes are presented in this section. These findings are based on data for Indianapolis, Indiana. It is felt that they are generally applicable to nonmetropolitan areas as well. Where differences might occur they are so noted.

The composition portion of the analysis is based on eleven selected categories of household solid wastes. The definition of waste categories was based primarily on the types of materials involved and their potential for recovery. The categories selected include:

(1) Clear glass.
(2) Brown glass.
(3) Green glass.
(4) Aluminum.
(5) Other metals.
(6) Newspaper.
(7) Rags, textiles, and leather.
(8) All other paper.
(9) Plastics, rubber, and styrafoam.
(10) Grass, tree cuttings, and wood.
(11) Garbage/other (food wastes, dirt, ashes, ceramics, and miscellaneous).

Average Waste Generation Rates

Primary data on quantities of waste components were obtained from a sample of solid wastes collected in Indianapolis over a 6-week period, July 10 to August 18, 1972. A stratified random sample of municipal waste collection areas was used. Twenty-four observations were obtained with each observation representing an aggregate of waste generated by 60–90 households in a 1- to 3-block area of the city. A total of 29.3 tons of solid wastes were sorted into the 11 selected categories or components.

Average quantities of solid waste per capita and per household and the standard errors of the various components of household solid waste are presented in table 1. For all solid wastes combined, average weekly quantities of 12.84 pounds per capita and 37.82 pounds per household were found. These findings are similar to those reported in (3) (6) and, (15).

TABLE 1.—MEAN AND STANDARD ERROR OF WEEKLY QUANTITIES OF 11 COMPONENTS AND TOTAL QUANTITY OF HOUSEHOLD SOLID WASTES, PER CAPITA AND PER HOUSEHOLD, INDIANAPOLIS, IND. 1972

Component	Per person (pound)		Per household (pounds)		Percent of total
	Mean	Standard error	Mean	Standard error	
Clear glass	0.94	0.30	2.73	.83	7.3
Brown glass	.46	.29	1.31	.70	3.6
Green glass	.14	.07	.43	.23	1.1
Aluminum	.07	.03	.19	.12	.6
Other metals	1.15	.38	3.41	1.39	9.0
Newspaper	1.32	.62	3.82	1.73	10.3
Textiles	.35	.17	1.04	.59	2.7
Other paper	1.87	.55	5.55	2.04	14.6
Plastics	.51	.21	1.51	.61	4.0
Grass	3.15	3.97	9.50	13.27	24.5
Garbage (other)	2.83	.97	8.32	2.70	22.4
Total weight	12.84	4.45	37.82	15.85	100.1

Source: (14)

Grass, garbage/other, and glass were observed to be the major components in the waste stream according to their weight. Grass was the largest single component and exhibited the greatest variability with a standard error greater than its mean on both a per capita and per household basis. Garbage/other was the second largest component followed by other paper, newspaper, and other metals. The three types of glass when combined contributed about 1.5 pounds per capita per week or nearly 4.5 pounds per week per household. About 60 percent of all glass was clear, 30 percent was brown and the remaining 10 percent was green.

As compared to urban communities, households in nonmetropolitan areas are likely to employ alternate methods for the handling of grass and grabage, the two most significant components by weight. To the extent that these quantities do not enter the waste stream, community waste management in nonmetropolitan areas will be affected. Any potential that these materials might have for resource recovery would stem from their energy value. If energy recovery is not contemplated, their absence would serve only to reduce the load on the solid waste system.

Waste Component Relationships

The major determinants of household consumption activities are hypothesized to be household income (Y), age structure of households (A), household size (F), and ethnic origin (E). These factors are hypothesized to influence consumer tastes and preferences, and thereby the quantity and composition of waste residuals. To account for variation in the quantities of each of the 11 waste components and the aggregate quantity of solid wastes the following model was estimated:

$$W_k = \beta_0 + \beta_1 Y + \beta_2 F + \beta_3 A + \beta_4 E + \epsilon_k$$

where:

W_k = quantity of the k^{th} component ($i = 1, 2, \ldots, 12$) in pounds per household per week.
Y = average annual household income in dollars as measured by average value of housing and property (house and land).
F = household size in numbers of persons.
A = percent of people 18 to 61 years of age at June 30, 1970.
E = percent of black people.
ϵ_k = random disturbance.

Data on the explanatory variables in the equations were collected from the 1970 Census. These data were aggregated from census data for individual city blocks. There was full enumeration of all households for age structure, numbers of people, and numbers of household units in the 1970 Census. Due to disclosure problems, no data were available by individual blocks on income. The estimated value of house and land was therefore used as a proxy for income levels for city blocks. The simple correlation between mean household income and mean household value of house and land for census tracts from the 1970 Census was +0.845.

The estimated coefficients, their respective standard errors, coefficients of determintion adjusted for degrees of freedom (R^2), and computed F values, for the 12 linear equations are presented in table 2. Explanatory power of the estimated equations ranges from .14 to .68 with the amount of explained variation significant at the .10 level for all estimated equations except the equation for brown glass. While there are many nonsignificant coefficients in the equations, 28 of the 45 coefficients are significantly different from zero at the .10 level.

TABLE 2.—ESTIMATED COEFFICIENTS, STANDARD ERRORS AND COEFFICIENTS OF DETERMINATION FOR SOLID WASTE COMPONENT EQUATIONS ESTIMATED FOR INDIANAPOLIS SAMPLE DATA, JULY 10–AUG. 18, 1972

Waste component	Intercept	Household income coded [1]	Household size	Percent 18–61	Percent black	$\bar{R}^2$ [2]	F [3]
Clear glass	−4.1656	−0.0002 (.0003)	0.6605 [4] (.2542)	0.0971 [4] (.0294)	0.0011 (.0043)	0.35	[4] 3.68
Brown glass	1.1681	−.00035 (.00025)	.0935 (.2471)	.0011 (.0285)	−.0095 [4] (.0042)	.14	1.57
Green glass	−.7589	.0002 [4] (.0001)	.1225 [5] (.0632)	.0155 [4] (.0073)	.0021 [5] (.0011)	.49	[4] 6.03
Aluminum	−.5789	.00007 [4] (.00004)	.1166 [4] (.0352)	.0088 [4] (.0041)	−.0008 (.0006)	.37	[4] 3.91
Metals	−8.2951	.0004 (.0004)	1.6360 [4] (.3740)	.1350 [4] (.0532)	.0007 (.0063)	.49	[4] 6.06
Newspaper	−2.1415	.0013 [4] (.0005)	3.049 (.5335)	.1028 (.0616)	−.0069 (.0090)	.34	[4] 3.47
Textiles	−2.0364	−.0004 [4] (.0002)	.7466 [4] (.1562)	.0187 (.0180)	−.0045 (.0026)	.51	[4] 6.40
Other paper	−4.6672	.0007 (.0004)	2.0853 [4] (.4355)	.0901 [5] (.0503)	−.0264 [4] (.0073)	.68	[4] 12.45
Plastics	−3.6733	−.0003 [4] (.0002)	.7447 [4] (.1504)	.0618 [4] (.0174)	−.0077 [4] (.0025)	.64	[4] 10.25
Grass	−10.5423	.0151 [4] (.0035)	.6332 (3.5760)	.3700 (.4098)	−.0260 (.0596)	.50	[4] 6.18
Garbage (other)	−1.5640	−.0030 (.0009)	1.7014 [4] (.7711)	.0940 (.0891)	.0034 (.0130)	.43	[4] 4.84
Total weight	−37.2609	.0125 [4] (.0041)	8.8447 [4] (4.1330)	.9949 [4] (.4774)	−.0743 (.0695)	.52	[4] 6.73

[1] Household income data is coded in derivations from the mean and divided by 1,000.

[2] $\bar{R}^2$ is R^2 corrected for the degrees of freedom.

[3] The F value of significance at the 0.05 level with (4.19° of freedom) is 2.90.

[4] Significant at the 0.05 level (t=2.09 with 19 degrees of freedom).

[5] Significant at the .10 level (t=1.73 with 19 degrees of freedom).

Source: (14).

Even though the statistical results are somewhat mixed they do suggest certain tendencies which appear reasonable. Larger quantities of solid waste (except for clear glass, brown glass, textiles, plastics, and garbage) are associated with higher household incomes. In the case of textiles, higher income households may either hold a larger inventory of used clothing or channel it through goodwill institutions. The coefficients of the household size variable are not particularly surprising and indicate that larger households simply generate more of all types of solid wastes. The positive signs of the coefficients of the percent 18–61 variable suggests that higher waste generation occurs in the middle of the life cycle.

Seasonal Variability

Data for a seasonal index of total household solid wastes were obtained from municipal collection records for the City of Indianapolis. This information was available by truckload on a daily basis for each collection route. It was aggregated into 13 successive four-week periods for each of two years, January 1, 1970 to December 31, 1971. It was further grouped according to 1970 Census tract boundaries.

As reported in table 3, aggregate household solid waste exhibits considerable variability throughout the year. Low quantity periods occur during the winter while high quantity periods occur in late spring and summer. A large part of this seasonal variation must be attributed to grass and yard wastes. In nonmetropolitan areas where many households manage these types of waste on their own, the quantity of residuals entering the waste stream would be expected to exhibit less variability. This should lessen the need for equipment with substantial excess capacity since peak periods would be less pronounced.

TABLE 3.—SEASONAL INDEX OF AGGREGATE SOLID WASTE PER HOUSEHOLD, PER 4-WEEK PERIOD, SELECTED CENSUS TRACTS IN INDIANAPOLIS IN 1970 AND 1971

Time period	Index	Time period	Index
Jan. 1 to Jan. 23	71.36	July 16 to Aug. 12	114.82
Jan. 29 to Feb. 25	76.71	Aug. 13 to Sept. 9	109.69
Feb. 26 to Mar. 25	85.70	Sept. 10 to Oct. 7	107.04
Mar. 26 to Apr. 23	102.62	Oct. 8 to Nov. 4	107.45
Apr. 24 to May 19	109.85	Nov. 5 to Dec. 2	103.45
May 20 to June 17	112.39	Dec. 3 to Dec. 31	90.83
June 18 to July 15	105.92	Average	100.00

Source: (13).

RESOURCE RECOVERY

Nonmetropolitan communities and rural areas have several options available for the disposition of their solid waste. Land-based disposal techniques have traditionally been used. Their compatibility with environmental criteria under proper management practices has been demonstrated. More recently, interest has turned to the possibility of reusing at least certain of the resource components found in the community solid waste stream.

Adoption of resource recovery as a solid waste management strategy depends on at least four considerations. First, what is the resource content of the available solid waste? Second, what markets exist for the various resource components? Third, what technologies are available for the recovery of selected resource components? And fourth, what types of system organization are possible, or necessary, to facilitate resource recovery in nonmetropolitan areas?

Together these considerations comprise the output dimension of solid waste system quality. As noted earlier, this output dimension when combined with the input dimension (composition and quantity) represents the broader concept of system quality in relation to a materials conservation objective.

Composition

Resource recovery is obviously dependent upon the composition of the solid waste to be processed. The resource composition of residential solid waste has already been discussed. It was found that if glass and metals are recovered, some 21.6 percent of the waste stream by weight would be involved. Adding paper and textiles brings the total to 46.5 percent. This is the initial composition, however, which must be subjected to a recovery process. One such typical process (12) would recover only 38 percent of the original input. Approximately 62 percent of the waste would remain for disposal in a landfill.

For energy recovery, the initial composition data would suggest that some 78.5 percent of the solid waste by weight could be used. If ferrous metals are recovered first, the input to the energy recovery process would be the remaining 91 percent of the waste stream. An estimated reduction rate of 76 percent appears reasonable for this type of energy process (10); ferrous metal recovery efficiency would amount to 57 percent. The result, therefore, would have 69 percent of the original solid waste by weight used for energy recovery, 5 percent going to ferrous metal recovery, and the remaining 26 percent in need of landfilling. To the extent that a market could be found for the energy recovery residue, the percentage of waste for landfilling might be reduced.

Less is known about the composition of commercial and industrial solid wastes. It is generally agreed that commercial waste consists mostly of paper and other packaging materials. Industrial solid waste tends to be industry-specific. Some amount of packaging materials are involved and scrap process materials also. Internal management of these latter materials is fairly typical.

Markets

Before a community can decide what it will recover from its solid waste stream, or how, the question of markets must be addressed. Several factors are important in this regard. First, the demand for recovered materials is a "derived" demand. It is a demand which results indirectly *through* the products which use it as an input. To the extent that these final products face a variable market so, too, will the recovered materials. Second, recovered materials generally compete with virgin raw materials. In the absence of any special demand for products made from recycled materials, producers can be expected to choose their cheapest source for inputs. Also, users of recovered resources often have minimum input requirements and face market outlet considerations that tend to focus their location in larger industrial areas. Finally, related to the overall competitive situation for recovered resources are institutional constraints. Alleged discriminatory freight rates provide one example; psychological barriers to "used" materials another.

Technology

Resource recovery systems can be broadly classified according to the types of materials reclaimed. As shown in figure 1, such systems are generally of two types. "Front-end" systems recover selected resources from the inert fraction while disposing of organic matter through traditional means. "Back-end" systems seek to recover both the materials and organic portions.

The so-called front-end systems range from civic organization efforts to collect newsprint and aluminum cans to large scale materials recovery facilities employing sophisticated technology. Back-end systems tend to focus on energy recovery. This means either the direct-firing of solid waste with coal or the conversion of solid waste through pyrolysis to a gas or oil product that can be substituted for natural gas or fuel oil.

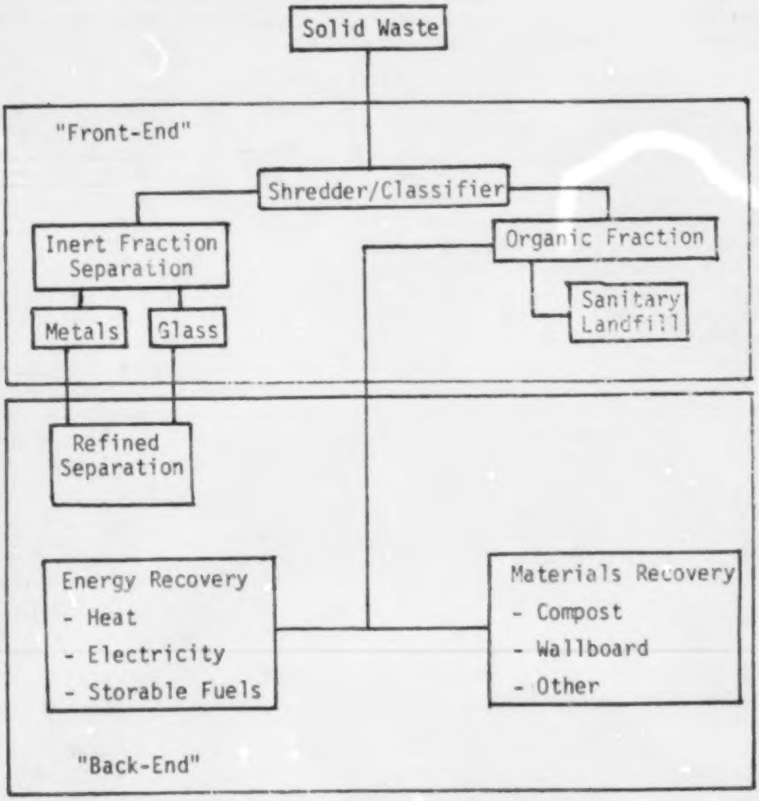
Solid Waste
"Front-End"
Shredder/Classifier
Inert Fraction Separation
Organic Fraction
Metals
Glass
Sanitary Landfill
Refined Separation
Energy Recovery
- Heat
- Electricity
- Storable Fuels
Materials Recovery
- Compost
- Wallboard
- Other
"Back-End"

FIGURE 1. Resource Recovery Systems Schematic.

Source: (1)

The projected scale for most resource recovery technologies ranges upward from 500 tons per day. Population needed to support such operations exceeds 200,000. Despite such projections, however, examples are emerging of resource recovery at a smaller scale. The Ames, Iowa, energy recovery facility, for instance, is designed with a capacity of 250 tons per day (*16*, p. 70). This facility provides a dry fuel supplement to be used with coal in the city's electric utility boiler. Early indications suggest a break-even operation. A capital cost of approximately $98 per ton of annual capacity has been incurred.

A second example is provided by the 300 tons per day pyrolysis units being proposed for several of Florida's resource recovery regions (*8*). These facilities are expected to produce a natural gas substitute for use by electric utilities. An operating revenue of up to $0.50 per ton is projected. A capital investment of just under $35 per ton of annual capacity is anticipated.

Another example of small scale resource recovery is the system suggested for Middlebury, Vermont (16). This system is based on a daily solid waste throughput of only 25 tons. Low pressure steam is to be produced at essentially a break-even cost. Capital investment will amount to some $68 per ton of annual capacity.

System Organization

The manner in which a nonmetropolitan solid waste system is organized can directly affect its feasibility. On the one hand, the choice of a technology or combination of technologies and their scale must be made. In addition, because resource recovery tends to be both capital intensive and market dependent, some form of intermunicipal cooperation may be necessary. An appropriate format for such cooperation must be determined.

Two recent studies have some bearing on these organizational issues. The first involves a benefit-cost analysis performed for a pyrolysis technique that is expected to have applicability in nonmetropolitan areas (4). The purpose of this analysis was to determine whether such a facility should be built and, if so, at what point in a 20-year planning period it should come to full capacity. Results indicated that such a plant would indeed have economic justification in the study county (see table 4). It was determined that full capacity should be reached within the first 5 years; a sanitary landfill being used thereafter. Net system benefits would be maximized at a daily capacity of 200 tons (requiring a population base of 80,000).[1]

A second study examined regional cooperation and its effect on the feasibility of resource recovery. A region consisting of eight rural counties (combined population of 160,000) surrounding a medium-sized city (97,000 in population) was selected for study. A mixed integer programing approach was adopted to model the region and the appropriate activities. Resource recovery alternatives included in the analysis were a dry fuel supplement process based on the St. Louis experiment (10) and a front-end materials recovery system proposed by the National Center for Resource Recovery (12). It was found in this study that solid waste could be assembled from all the counties and the city in such a way as to make energy recovery

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[1] A similar study undertaken for dry fuel supplement is reported in (5).

TABLE 4.—BENEFIT/COST ANALYSIS OF PYROLYSIS SYSTEM

	Year at full capacity				
	1975	1980	1985	1990	1995
Plant capacity (tons per day)	185	250	317.5	383.7	450
Costs:					
Annual pyrolysis [1]	$820, 698	$1, 042, 624	$1, 260, 778	$1, 435, 152	$1, 663, 554
Residue disposal [2]	38, 894	48, 486	53, 231	55, 228	55, 664
Landfill beyond capacity [3]	131, 013	56, 078	19, 000	3, 405	0
Opportunity cost [4]	−303, 862	−378, 800	−415, 873	−431, 471	−434, 875
Total	686, 743	768, 388	917, 136	1, 062, 314	1, 284, 343
Benefits [5]	674, 575	840, 914	887, 411	917, 000	923, 518
Net benefits	−12, 168	72, 526	−29, 725	−145, 264	−36, 0825
TB/TC ratio [6]	.982	1.094	.968	.863	.719

[1] Operating and maintenance costs plus amortization of initial investment.
[2] Residue from pyrolysis process disposed of at landfill.
[3] Landfill used in combination with pyrolysis when the latter facility reaches full capacity.
[4] Cost for disposal of all solid waste at a landfill; permits evaluation of pyrolysis relative to landfilling.
[5] The Btu-equivalent fuel value of oil produced via pyrolysis from solid waste.
[6] Ratio of total benefits to total costs; value greater than 1 indicates positive net benefit to be derived from pyrolysis relative to sanitary landfill.

Source: (4, p. 8)

an economically feasible option (see table 5). In fact, the production of fuel supplement would make the greatest economic sense for the study region when priced at 50—as well as 100—percent of its BTU-equivalent value. Front-end materials recovery (*i.e.*, aluminum, ferrous metals, glass, and so forth) was found to have less economic justification than either energy recovery or sanitary landfilling. It is conceivable, however, that in light of predicted materials shortages, the longer-run benefits to be gained through materials recovery might more than offset its higher cost.

TABLE 5.—REGIONAL ANALYSIS OF SOLID WASTE MANAGEMENT OPTIONS

Processing/disposal option	Annual system cost [1]	
	Net	Net per ton
County landfills [2]	$1, 044, 786	$7.88
Regional landfill [3]	1, 083, 965	8.17
Resource recovery No. 1 [4]	473, 654	3.50
Fuel supplement at 50 percent [5]	991, 668	7.48
Resource recovery No. 2 [6]	1, 323, 457	9.93

[1] Annual system cost covers storage, collection, and processing/disposal activities.
[2] County landfills are least-cost individual sites for each of the 8 counties and city in the study region.
[3] Regional landfill is the least-cost single site for the entire region.
[4] Resource recovery No. 1 is a dry fuel supplement recovery process based on the St. Louis experiment. A refuse derived fuel for direct firing with coal is produced. Value of the fuel is based on a Btu equivalent for coal with the latter priced at $25 per ton.
[5] Value of refuse-derived fuel reduced by 50 percent.
[6] Resource recovery No. 2 is a front-end materials recovery process based on the system design of the National Center for Resource Recovery, Inc. Materials to be recovered include ferrous metals, aluminum, and other nonferrous metals, and and glass cullet.

Source: (5, p. 188)

SUMMARY

Although several dimensions of solid waste system quality are relevant, this paper has focused primarily on those relating to the objective of materials conservation. An input quality dimension concerned with the composition and quantity of solid waste was discussed first. Average weekly residential generation rates of 12.84 pounds per capita and 37.82 pounds per household were reported. Solid waste quantities and composition were found to be especially dependent upon income levels, household size, and the age composition of the family. A seasonal index of waste quantities showed peak loads to occur during late spring and summer months as yard maintenance activities are performed.

An output quality dimension related to the quantity and marketability of solid waste components was also described. Preliminary indications suggest that resource recovery in nonmetropolitan areas could be feasible if markets are found. In light of scale requirements and capital needs, the viability of resource recovery might be enhanced through some form of regional cooperation.

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OUTPUT AND COSTS OF LOCAL GOVERNMENT SERVICES

[By Werner Z. Hirsch[*]]

While the 1950's and 1960's saw metropolitan areas grow more rapidly than any other part of the United States, this period has come to an end, at least temporarily. Thus, while metropolitan areas' population grew by 1.5 percent between 1960 and 1970, the growth of nonmetropolitan areas was only 0.7 percent. Just the reverse picture holds for the first half of the seventies. Between 1970 and 1975, metropolitan areas grew only by 0.7 percent per year, while nonmetropolitan areas increased by 1.2 percent (29).

There clearly are many reasons for this sudden turnaround, which favors nonmetropolitan areas. Most likely, one reason relates to the high non-market costs incurred by those who live in large metropolitan areas. Thus, Irving Hoch found wage rates, on average, increasing about 9 percent per order of magnitude of population—a place with 10 million people having a 9 percent higher wage rate than did a place of one million for the same work. Half of this increase is required to compensate for cost-of-living increases. The other half is explained by such non-market costs as the value of time spent in the journey-to-work, the value of risk not covered by insurance, and the costs of air pollution (13).

But what about local public services in metropolitan areas compared to nonmetropolitan areas? Are there differences in quality and variety as well as in the costs of providing such services? In order to seek an answer, particularly to the last question, it is important to define and quantify local government output, a production function as well as a cost function. Such a step will be taken next, before a special effort is undertaken in relation to one important local government service.

OUTPUT AND PRODUCTION FUNCTIONS

In general, government outputs are those amounts that result from the production process, basically expressed in physical units. Since the process takes time, a time dimension should be attached. A production function is conveniently expressed by an isoquant map, which relates the different combinations of physical inputs with outputs. It represents the relationship between inputs of productive factors and outputs per unit of time, subject to some constraints. A production function thus testifies to the specific service outputs that result from different sets of physical inputs at different scales of operation, under different service conditions, and in the long run with different states of technology. In more formal terms:

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$O=j(I,S,T)$.

where:

O=output.

I=input factors.

S=service conditions.

T=state of technology.

Service conditions differ from input factors not only in that their effect tends to be negative, but also in that they cannot be controlled by decisionmakers, except to a minor degree.

Government outputs have quantity and quality dimensions, which can be traded off against each other. Such service output is the product of service quantity and quality, *i.e.*,

$O=j(A,Q)$.

Since governments, and particularly local governments that furnish police services, are usually mandated to serve all constituents, public decisionmakers tend to vary the quality more often than the quantity of the service they provide.

From the above two equations, we can obtain

$AQ=j(I,S,T)$.

for those instances in which it is not feasible to combine output with quality measures, the last equation can be rewritten as follows:

$A=k(Q,I,S,T)$.

In the short run, technology changes very little, if at all, and therefore T can be dropped from the equation.

In many empirical production functions, output (O) is measured in terms of some "index", *e.g.*, achievement test scores, arrest rate, etc. We will consider output measurement in some further detail. Earlier we already pointed to quantity and quality dimensions of output. The quantity-quality issue can be advanced by identifying a basic service unit that can have various quality dimensions. A basic service unit may be a ton or a pile of garbage collected, a cubic foot of water delivered, a street block protected against crime, a first grader educated, etc. Quality dimensions can then be attached to this unit. For example, in relation to garbage collection, quality variables could include the location of the garbage pickup, its frequency, etc.

The assessment of service quality can be considered from the consumers' and the producers' point of view. Clearly, the consumer evaluation is most important. It could proceed along the lines of estimating a hedonic price idex, an effort replete, however, with empirical difficulties. A producer evaluation is simpler and merely requires the fitting of a multiple regression equation which explicitly includes quality characteristics among its right hand variables. The left hand variable is a unit cost measure. The producer evaluation has been applied to refuse collection in St. Louis in 1960. Once-a-week curb collection was found to cost \$6 compared to once-a-week rear-of-house collection costs of \$12, twice-a-week curb collection costs of \$10 and twice-a-week rear-of-house collection costs of \$16 (12).

AN EXAMPLE: POLICE PROTECTION

We will turn now to a detailed examination of a particularly interesting service that is publicly provided to all communities.

Production Functions

By far the most significant theoretical study which constructs a careful structural framework is provided by Becker (3). It can be used to assess the efficiency of crime prevention efforts. Specifically, Becker models the process of individual choice which underlies the supply of criminal offenses. Crime is viewed as an economic activity with rational participants. A person commits a crime if his expected utility exceeds the level of utility he expects to derive from alternative legal activities. Thus, the number of crimes committed by an individual depends on the probability of conviction, the expected severity of punishment, as well as variables reflecting legal income earning potential, environment, and taste. The probability of being apprehended and convicted constitutes a deterrence against criminal activity. It links police activities to crime prevention.

Crime functions have been estimated by Carr-Hill and Stern (5), Sjoquist (26), Ehrlich (8), and Phillips and Votey (20). Ehrlich estimated 47 equations, which regressed the number of offenses per capita on the probability of conviction (measured by the ratio of convictions to reported offenses) and other variables, including the expected severity of punishment. He found a statistically significant deterrence effect. Ehrlich's use of the probability of apprehension and imprisonment as his measure of police output ignores the crime prevention effect of police activities other than those directed specifically toward the apprehension of criminals.[1] This same problem also exists in relation to the use of the proportion of "cleared-up" offenses by Carr-Hill and Stern (5) as an output measure.[2] But crimes may also be deterred by apprehending and warning wrongdoers and by the "visibility" of police patrols. Phillips and Votey (20) also found that in California in 1966, the likelihood of conviction and the severity of sentence significantly deterred crime. Furthermore, increasing the number of law enforcement personnel significantly increased the likelihood of conviction, holding the offense rate constant.

Ehrlich was unable to find a statistically significant relationship between per capita police expenditures and the probability of apprehension and imprisonment, but his point estimate of the relevant coefficient was positive and large enough to indicate a relationship of economic significance (if only one could have a greater degree of confidence that the point estimate accurately reflects its true population value).

Alternatively, prevention of crimes can be considered as the objective of police activity; then the number of crimes committed (per capita) is an inverse measure of police output. This approach is used by Shoup and Mehay (25), who also distinguish between "visible" and other crimes, using both FBI and California data. They regress various input measures, which include both visible crimes and total crimes. Their results are, however, disappointing. The coefficients of the input variables are generally associated with very low levels of significance, and where significant coefficients are found in one equation (*e.g.*, using total crimes as the output measure) the same variables are not significant in other equations (e.g., using "visible" crimes).

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[1] An advantage of using the arrest rate, and dropping the distinction between arrest, conviction, and imprisonment as an output measure, is that it best conforms with the theoretical framework proposed by Becker (3).

[2] In the United Kingdom, an offense is cleared-up if the police are convinced that the identity of the offender is clear.

Many economists have examined the relationship between police inputs (measured often by per capita police expenditure) and crimes without finding a significant relationship. Yet we would expect police activity to have a deterrent effect on crime directly because of police "visibility" or indirectly via an increased probability of apprehension and incarceration. Allison (1), Jones (15), Kakalik and Wildhorn (16), Ogur (19), Pressman and Carol (23), and Walzer (31) could not detect a significant deterrence effect. Greenwood and Wadyki (10), McPheters and Stronge (18) and Swimmer (27) using simultaneous estimation techniques, obtained inconclusive results. The former reported a perverse positive effect and the latter had results of a low level of statistical significance. Only McPheters and Stronge (18) found a deterrence effect at the 95 percent confidence level. The results, other than the latter, could be attributed to an identification problem when crime increases in an area, more police are dispatched to it although it should disappear when simultaneous equations are used. It also has been argued by Greenwood and Wadyki that, "... additional police are more efficient in deterring crime, and ... a relatively small percentage of all crimes are reported with the consequence that a rise in the number of police per capita results in an increase ... in (reported) crime" (10, p. 145–146). Finally, absence of a deterrence effect may result from a declining marginal efficiency of police protection as population increases. It has been hypothesized that the cost of law enforcement increases as the square of distance from the city core. Allison found that as per capita crime increase and population grows, law enforcement expenditures grow disproportionately faster, thus giving rise to an empirical result of a positive correlation between per capita crime and population (1, p. 195).

Finally, Chapman, Hirsch and Sonenblum combined the number of prevented crimes are combined with arrests to provide a measure of police output (6). The justification for using the prevention of crimes as an output measure is that it is (or at least should be) one of the basic objectives of police activities. They use both their estimates of prevented crimes and the arrests in absolute and relative terms as components of a measure of police output. In both formulations, these components are aggregated into one index using five different weighting schemes, thus obtaining five different output measures. Prevented crimes are the number of observed crimes less the number of predicted crimes, where the number of predicted crimes is estimated from a crime function model based on cross section data. With the aid of these output estimates and time series data, production functions are estimated. Input factors include motorcycle officers, field officers, non-field officers, and civilian employees. A further variable represents knowledge by the police about the potential criminal population in their jurisdiction. High levels of significance are associated with most of the coefficients. The overall conclusion is reached that during 1956–70, the Los Angeles Police Department has enjoyed increasing returns to a number of its inputs. Particularly, field officers, civilian employees, and motorcycle teams have elasticities with respect to output that were substantially greater than one. It was found, however, that an appropriate production function gives a heavy weight to the punitive component of output, i.e., arrests.

COST AND QUASI-COST FUNCTIONS

A bona fide police agency average cost function has as a dependent variable an index of police agency cost per unit of output. To estimate such a function therefore, will require output measurement, just as in production function estimation. Such a function differs from what an average quasi-cost function of a police agency in that the latter uses per capita police costs (or expenditures) as a proxy of average unit cost, while using police output as an independent variable. The inappropriateness of this proxy for certain purposes, particularly where demand elasticity for police services exceeds unity, will be discussed below in relation to expenditure determinant functions. Nevertheless, under certain conditions, quasi-cost functions are suited to test hypotheses about the presence of scale economies related to the size of government.

Inherent in the estimation of a police cost or quasi-cost function is the problem of defining costs. Even if we settle on agency costs as compared to social costs, as is usually done, we still must decide whether to deal only with operating costs. That is what most studies have done. They have excluded capital costs and neglected fringe benefits, including the increasingly important retirement contributions.[3] Cities differ greatly as to their per capita debt, which in most cases is, however, quite large. In 1972–73, for example, cities with 1,000,000 or more residents had an average per capita debt of $776, although cities in the 50,000 to 100,000 category had only a $161 per capita debt (28).

Cost Functions

Government agency cost functions (as opposed to social cost functions) can be related directly to government production functions. Long run average cost of government service is affected by the service quality, quantity, price of factor inputs, service conditions affecting input requirement, and state of technology. In formal terms:

$$AUC=a(Q,A,I,F,S,T).$$

where new notations are

AUC = average unit costs.
F = input factor prices.

Compared to a production function, the only additional information required for estimating a cost function is input factor prices.

There exist few police cost functions; an exception is that by Walzer (31). He measured police output by employing an index of the number of cleared offenses, accidents investigated, and miles travelled by police vehicles. Each item was weighted by the time devoted to handling and disposing of an average offense. The activities index was treated as a scale measure. Police expenditures were divided by the service index to calculate average cost; it was regressed against a number of independent variables, including activity level. Other independent variables included population density and land area which might be interpreted to reflect service conditions; ratio of police officers to population to reflect input factors; average wages to reflect input factor prices; and percentage of known offenses cleared by arrest to reflect service quality. A statistically negative relation was found between average cost and activity level, which testifies to the presence of a certain type of scale economy, a type however, which does not bear on the metropolitan consolidation question. (When average cost was regressed against population, and a quasi-cost function was derived, no statistically significant relation was uncovered.)

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[3] Beaton (8) included per capita municipal payments for pensions, fringe benefits, and social security as independent variables.

The index of police services developed by Walzer has a number of shortcomings. The first relates to the weights chosen. Is time devoted to handling and disposing of an average offense appropriate for aggregating levels of different services? Second, can it be assumed that each of these different services is of equal quality across cities or over time? Third, is it possible to define service levels independently of the usage of inputs in providing those services? And fourth, are accidents investigated and vehicle-miles-travelled output, or are they rather inputs?

Quasi-cost Function.—Police agency average quasi-cost functions provide a way-station and evolutionary link between the theoretically appealing cost (and production) functions that are so difficult to quantify, and the theoretically less appealing, but readily quantifiable expenditure determinant functions.

Quasi-cost functions have been estimated by Hirsch (11) and Schmandt and Stephens (24). The first study was mainly interested in testing the hypothesis that the average cost of providing police services of a given quality level varies with the size of the government unit measured in terms of night-time population served. It was designed to elucidate the scale economy question relative to metropolitan consolidation. For input factors the study included an average per capita real property value proxy. The service quantity variable was approximated by size of night-time population, while the quality variable was obtained through independent ratings by five police experts. Service conditions included street mileage; population density; non-white population; age; and wholesale, retail and service business.

It was found that police protection, like other horizontally integrated local government services, does not incur either scale economies or diseconomies beyond a relatively small size of night-time population. Instead, the average quasi-cost function appears to be horizontal over a wide population range. Microeconomic theory can readily explain such results. Unlike most private industry, police protection and other horizontally integrated local government services require relatively close geographic proximity of service units to service recipients; this prevents the establishment of large police stations. Moreover, police services are labor intensive, leaving little, if any, room for bulk purchases of input factors to result in lowered factor prices. If anything, with more than two thirds of police budgets going for wages and salaries, large departments are likely to pay higher rates than lower ones.

Schmandt and Stephens (24) estimated an average quasi-cost function by relating service level and population size with per capita police expenditures. As a service level measure, they developed an activities index that aggregated 65 activity categories. This index included such items as foot and motorcycle patrols, criminal investigation, youth aid bureau, ambulance and pulmotor service, school crossing guards, radio communication, radar speed units, and manual traffic control. They found a negative relationship between per capita expenditures and output (activities index) and inferred from this that economies of scale were indicated. This inference is logically invalid for reasons to be developed in relation to expenditure determinant functions. Moreover, the partial correlation coefficient relating per capita police expenditures and population size was .22, which is statistically insignificant for a sample of 19. There are drawbacks associated with the Schmandt and Stephens model. Their activities index is just the equally weighted sum of a variety of police activities to be of uniform quality over all the cities surveyed, a most unrealistic assumption. Moreover, their model is serious misspecified, since intercity differences in characteristics affecting the efficiency of the supply of police services are completely ignored.

Popp and Sebold (22) pursue a novel line of inquiry. They argue that the end-product of police services is the protection of lives and property of citizens, and that this product could be standardized across all cities by the payment of full compensation to crime victims. Differences in crime rates across cities would be offset by differences in compensation payments, and all citizens would receive 100 percent protection in the sense that they will be compensated for any losses from crime they may incur. The total costs of providing this protection would then be the total expenditures on police services plus the total amount of compensation for unrecovered losses incurred by victims. Since the quality of the product, *i.e.*, protection, is fully standardized via compensation, output can be measured by the number of people receiving this protection, *i.e.*, the population in the relevant jurisdiction. Thus, they measure the cost of police protection as an expenditure on police services plus (hypothetical) expenditure on compensation. This is a quasi-cost function in the sense that police expenditure is used as one of the components of total costs. A drawback is the fact that while local authorities do have an obligation to provide police services they need not and do not make payments to crime victims. Hence, the local authorities are unlikely to choose the cost minimizing combination of police activity and compensation. Thus, cities are unlikely to operate, even in the long run, on their long run cost curves. Still, the Popp and Sebold model is useful in examining the question of optimal city size (with respect to police protection). They regressed population size (*i.e.*, output measure), population density, demographic characteristics, economic status of the population, and other variables on their measure of average cost, and found that average costs increase with city size.

Expenditure Determinant Functions

Local government expenditure determinant functions express the level of per capita expenditures per unit of time as a function of several of its "determinants", *i.e.*, explanatory variables. The earliest concern with what determines local government expenditures can be traced back to Colm (7). He used scatter diagrams to estimate the effect of income, urbanization, industrialization, and population density on expenditures. Detailed police expenditure determinant studies, using single equation regression techniques and the same variables were first made by Fabricant (9). They were followed up by Brazer (4). Using data for 462 U.S. cities, Brazer found that income, intergovernmental revenue, population density, and population size all were significant determinants of police expenditures. However, Brazer checked these results using data from three smaller samples of cities in Massachusetts, Ohio, and California and found that variables which were important in one State were not always important in the other States. Using a fifth data base, the 40 largest U.S. cities (including overlying governmental units), he found that population density, the ratio of city population to metropolitan population, and intergovernmental revenue were all important determinants of police expenditures, but that per capita personal income was not important.

Weicher (32) offered an elaborate categorization of independent variables: size, intergovernmental revenues, metropolitan political fragmentation, fiscal capacity, community tastes, and service conditions. The non-service condition variables represent a mix of demand considerations (*e.g.*, tastes and perhaps fiscal capacity) and supply considerations (*e.g.*, fragmentation). Using central city data for 1960, Weicher employed a least squares regression analysis to examine the influence on police expenditures of variables relating to unemployment, ethnic background, age of population, education level, housing conditions, and so forth, in addition to the variables used by Brazer. In all, 22 variables appear as explanatory variables in the police expenditure determinant equation; 12 of these were found to be significant.

No major improvements in the police expenditure determinant literature is found since Colm (7) and Fabricant (9), except perhaps for the addition of variables. The result has been a diversified smorgasboard of explanatory variables, reflecting cost conditions contaminated by demand factors. Neglecting this contamination issue, certain steps have been taken to deal with some other econometric issues. For example, one problem associated with the estimation of police expenditure determinant functions is the existence of collinearity in the explanatory variables. Pidot (21) attempted to overcome this statistical problem by using principal component analysis to create six new variables. This type of analysis is valuable in that the new components have convenient statistical properties (*i.e.*, collinearity in the data is minimized), but suffers from the drawback that it is not always obvious what these components represent. As the outcome of this analysis, Pidot found that the degree of metropolitan development, the level of general wealth, and an index of size were all significant of police expenditures. Likewise, McPheters and Stronge (18) used principal component analysis to reorder a large number of determinants into a more manageable set of "underlying" factors.

Wood (33) and Masotti and Bowen (17) relied on factor analysis to reduce determinants into fewer, but broader groups. Furthermore, Horowitz (14) applied a simultaneous equation approach, with limited success, to local expenditure determination.

The quality of estimates has been questioned when cross-section data are used and no tests made for heteroskedasticity within the sample. Whether there are structural differences between different elements of the sample is crucial to variance analysis. Beaton (2) argued that regression equations fitted to broad population ranges produce heteroskedastic residuals. Furthermore, there is a structural difference between cities which are growing in population and those which are declining. There are indications that growing cities behave quite differently than do declining ones. For instance, cities which are losing population have higher absolute government outlays compared to growing cities. They have more municipal workers per capita and also higher wage rates. Thus, per capita police expenditures and number of police officers in older cities are about 50 percent higher than in younger cities (28). The reason may be increased congestion, inertia in adjusting to declining demand, and a municipal labor force that on the average has substantial seniority. That cities which are growing are structurally different from those that are declining in population is confirmed by Beaton's test of heteroskedasticity.

To what use can police expenditure determinant studies be put? Police expenditures should be of relatively little interest to policy makers and administrators; they tell them little about the real costs of providing police services, about the level of output of police services, or about the demand price for police services (*i.e.*, the community's valuation of the marginal unit of output).

Furthermore, expenditure determinant studies do not elucidate either changes in cost or level of output, since total expenditures basically measure the product of output and cost per unit of output. This point has been flagrantly ignored in much of the literature on expenditure determinants. Not infrequently, expenditure determinant studies have been used to decide whether or not there are city size related economies of scale in the provision of police services. Observation of a negative relationship between population and per capita police expenditure is taken as implying the existence of economies of scale, and vice versa. The reasoning implicit in associating a negative relationship between population and per capita police expenditure with economies of scale is that population size is a good proxy for output. However, such reasoning is clearly wrong, as the assumed proxy relationship is, for the most part, invalid. If scale economies related to city size do exist, expenditures may well increase with output—this would indeed be the case whenever the elasticity of demand for police services is greater than unity.

However, in spite of their various shortcomings, expenditure determinant functions lend themselves to short-term expenditure projections, where underlying conditions change little.

EXPENDITURE DETERMINANT, COST, AND DEMAND FUNCTIONS

We will next show that every policy expenditure determinant function has imbedded in it a cost and a demand function. Formally, an expenditure determinant function of the Fabricant type is

$$E = m(P, Y, U),$$

where E is total expenditure (which differs from the usual per capita expenditure only by a factor of population), P is population, Y is per capita income, and U is degree of urbanization. For a community with the same degree of urbanization (U is constant at $\bar{U}$) and the same per capita income, $\bar{Y}$, it is asserted that total crime varies directly with population. Using total crime as a proxy for the demand for police services, we obtain the relation between demand for output of police services, O, and population size.[4] Making the demand for police services a linear function in quadrant I of figure 1, assumes that only the absolute level of crime, and therefore demand for police services, varies with population, and not the rate of crime or demand for police services, holding U and Y constant.[5]

With urbanization rising from $\overline{U}$ to $\overline{U}'$, the demand for police services increases and the equilibrium relationship between population and police output shifts from D to D′ in quadrant I. A greater degree of urbanization is associated with a higher crime rate (greater slope of D′ than D), and hence a greater demand for police services. Similarly, the police production function would be affected, *i.e.*, increased population density (in urban areas) may require that more police inputs be used in order to produce the same output as before. An increase in per capita income from $\overline{Y}$ to $\overline{Y}'$, similarly shifts the demand function. Demand for police services increases both due to the income effect (police service is assumed to be a normal good), and due to the fact that people are now wealthier and have relatively more to lose, so that the demand for preventive police services is higher.

Let us turn to the supply side and assume constant returns to scale and a linear production function, O, in quadrant II which is consistent with available evidence from Hirsch (11). Total cost, C, of inputs can be obtained by multiplying the vector of inputs on the horizontal axis by the vector of their respective prices (F) (quadrant III). It is linear and reflects the assumption that governments are not so large as to affect input prices. Thus, inputs are competitively supplied, so that $\overline{F}$ is a vector of competitively determined, posted market prices, constant at $\overline{F}$. We can derive a cost function by determining in quadrant II for any O_1 the corresponding I_1, *i.e.*, the required inputs to produce O_1, and then determining total costs of those inputs, and hence of that output, C_1 in quadrant III. The total cost function, C, (which differs from the average cost function, AUC, only by the factor of the units of outputs, *i.e.*, $C=O\text{x}AUC)=k(\overline{I},\overline{F},\overline{S}.\overline{T})$. Thus, in quadrants II and III, F, S, and T are being held constant. To take explicit account of the fact that all inputs are being used at fixed prices, we can respecify our original production function as $O=j'(I,\overline{S},\overline{T})$. The total cost function is mirrored in the expenditure function E.

We thus see that expenditure determinant functions can be considered to incorporate elements of demand (for police services) and supply (*i.e.*, cost of supplying police services) and that P, Y, and U enter into both equations. Determinant studies estimate expenditures jointly within a system of demand for and supply of police services by reducing this system of equations to just one equation. In effect, they thus estimate a single reduced form equation derived from a structural equation which is part of a larger structural framework.

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[4] Evidence for this assertion comes from Walzer (*31*, p. 432) who states, "Although population was not significantly related to per capita expenditure, a positive correlation was found between the index of services and population."

[5] Support for this assumption comes from Beaton (*2*, p. 343), and Walzer (*31*, p. 432), who found that population increases *ceteris paribus*, raise the absolute level of expenditure, but not the rate of per capita expenditure.

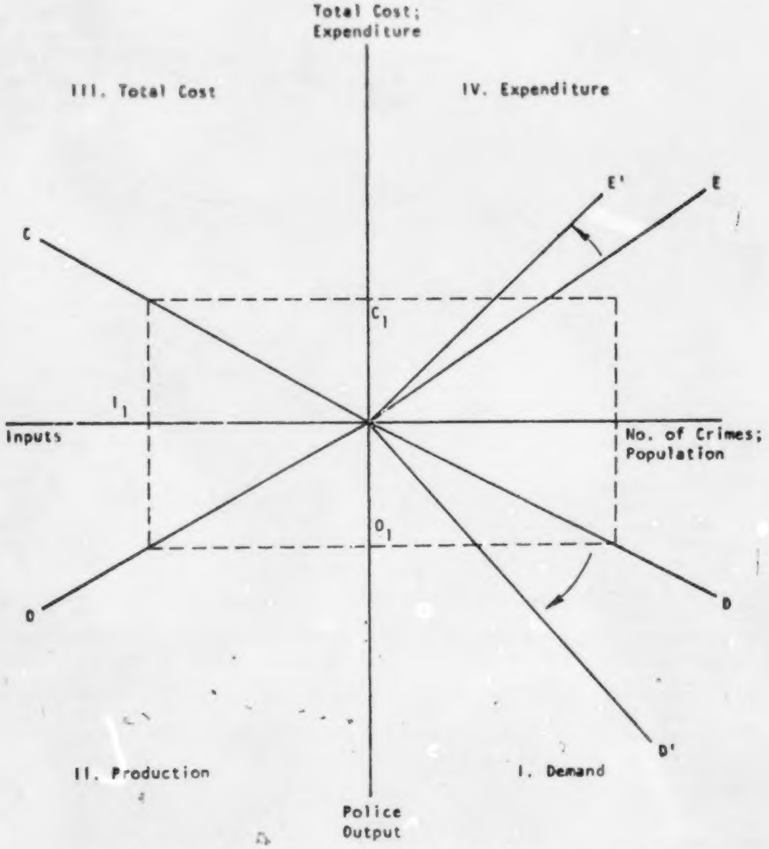
Total Cost;
Expenditure
III. Total Cost
IV. Expenditure
E'
E
C
C_1
I_1
Inputs
No. of Crimes;
Population
O_1
D
D
D'
II. Production
I. Demand
Police
Output

FIGURE 1.—Quadrants with Police Output Cost, Demand and Expenditure Determinant Functions.

SUMMARY

In recent years, scholars have carried out promising research towards a better understanding of government output, its cost and efficiency of production. However, most of the empirical research has centered on metropolitan areas. Many of the theoretical constructs that have been developed for metropolitan area research should also lend themselves to studies of nonmetropolitan areas. Nevertheless, research in metropolitan areas has one great advantage: often intangible variables importantly affect output and cost—and to the extent that these variables about equally affect all communities in the same metropolitan area—it often is not crucial to quantify them. However, if one works across towns in nonmetropolitan areas, the challenge of defining and quantifying such variables as labor-management relations, work ethics, attitudes toward juvenile delinquents, etc., can seldom be met effectively. Alternative research methods remain to be developed.

In summary, wherever research on government output and cost is carried out, it is important to separate bona fide cost functions that are consistent with micro-economic theory from quasi-cost functions. Compared to the latter, the former are in very short supply. Quasi-cost functions can elucidate scale economy questions. Moreover, expenditure determinant functions are in abundant supply. They should not be used for scale economy questions, but can reliably project short term expenditure changes, as long as the world remains reasonably stable.

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ESTIMATION OF COST-QUALITY-QUANTITY RELATIONSHIPS

[By Richard A. King and G. Bryan Wall*]

Introduction

A recent news release announced that U.S. auto makers have reduced the number of model choices for 1977. This year there are only 298 models to choose among. Community services alternatives are more difficult to identify, but are every bit as numerous. To complicate matters, instead of taking the family along to participate in selecting builder, configuration, and color scheme, the whole community gets into the act.

This paper addresses the question of how best to sort out the choices that are open to a community. Comparison shopping must be done mostly on paper, using synthesized models that are consistent insofar as possible with real-world track records. Comparisons must be made on paper because it is excessively costly to build full-scale models of alternative systems. Choices must be made among synthesized models because in very few cases will it be possible to transfer directly from one location to another a system which is working well. Although it is difficult to make direct comparisons from one community or setting to another, it is possible to find some clues as to how a system performs, at least insofar as certain components of that system are concerned. It may be quite useful, therefore, to obtain data on the performance of systems components in a variety of settings.

Characteristics of Cost Functions

The method recommended for estimating of cost functions for community services delivery systems was suggested by French, Sammet, and Bressler some 20 years ago in their landmark study of economic efficiency in plant operations (5). Basic to their cost formulation procedure is the idea that the rate and time dimensions of output must be clearly distinguished as a first step in the estimation of cost-volume relationships.

The three panels in figure 1 illustrate the importance of separating volume effects resulting from a change in rate of operation from volume effects associated with the time period over which a given rate of output is maintained. In panel A the rate of output is measured along the left axis and time of operation measured along the right axis. Total cost for the period is measured vertically. Note that as the

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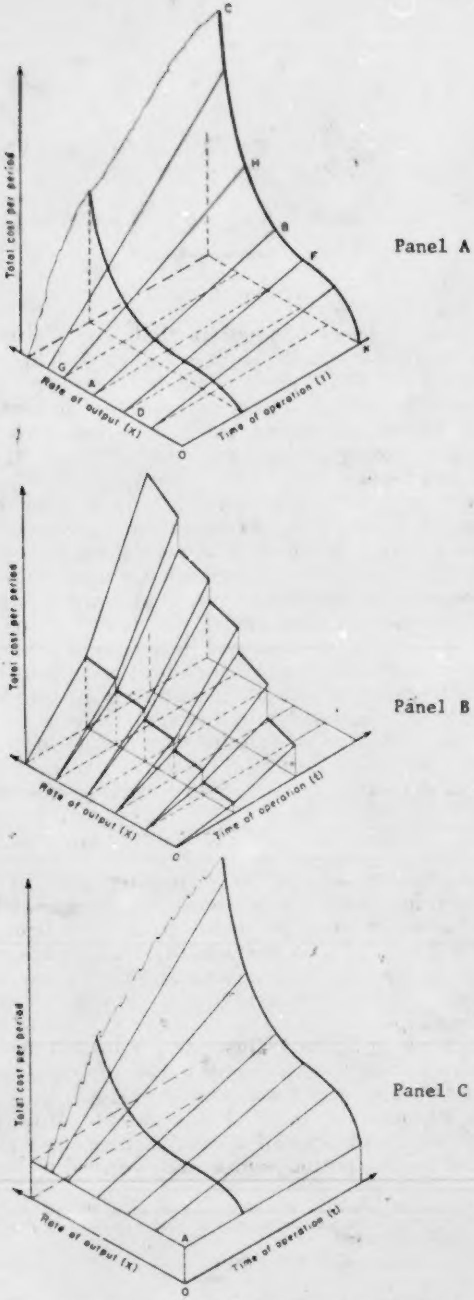
C
H
B
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K
G
A
D
O
Total cost per period
Rate of output (X)
Time of operation (t)
Panel A
Total cost per period
Rate of output (X)
Time of operation (t)
O
Panel B
Total cost per period
Rate of output (x)
Time of operation (t)
A
O
Panel C

FIGURE 1.—Effect of rate of output and time of operation on total cost per period (5, pp. 560, 571, 573).

time of operation increases from zero to K, total cost for each rate increases linearly.

In contrast, holding time of operation fixed, an increase in output achieved by increasing the rate at which production takes place produces a curvilinear cost pattern most clearly observed along the line KFBHC. The shape of this curve reflects the law of diminishing returns, in that total costs rise first at a decreasing rate and then at an increasing rate. A total cost curve of this form generates the typical textbook case of a U-shaped average cost curve. It is clear that choices concerning these two dimensions of plant output must be made simultaneously in order to achieve minimum total cost for a given level of output.

In panel B of figure 1 we find a simplified version of the first panel. Rate of output now has been segmented into five alternative levels. Time of operation is divided into two segments, the second resulting in a higher marginal cost as time increases than the first. In considering community services alternatives the five alternative rates of output can be viewed as five different intensities of facility use. These rates might represent, for example, five different school occupancy levels, while the time dimension can be viewed as the number of weeks per year during which the school is in session.

In panel C we find the cost function surface of the first panel raised by a fixed cost component OA. The height of this portion of the diagram reflects the cost of durable or capital goods associated with the particular plant size. Drawing the diagram in this way, it is clear that durable goods costs are independent of those variable costs associated either with rate of operation or with the time period over which the process is active.

COST AND REVENUE COMPARISONS

To apply these ideas to community services choices, it is necessary to develop a variety of financial reports. The first of these is a capital budget in which the initial investment and replacement costs for the project are clearly identified over the planning period. This may be as long as 20, 40, or 60 years or more. Included in the capital budget would be site acquisition and site preparation expenses, building costs, equipment outlays, and investment in vehicles. It is important that the capital budget clearly indicate those years in which replacement is anticipated. Some items may be replaced after 3 to 5 years while others will be serviceable for 20 years or more. It may be desirable to include in the capital budget roof replacement or other major repairs that occur at infrequent intervals.

A second financial statement should consist of an annual cost budget to assist community groups to visualize the day-to-day operation of the system. A very useful classification scheme for developing an annual cost budget was developed by Rogers and Bardwell (11). They proposed four cost categories. The first of these consists of *fixed overhead costs*. These costs are a function of the size of plant and can be eliminated only by sale of the project. Annual capital costs are included in this category together with taxes, interest, insurance, and maintenance outlays. Temporary closing of the plant has no effect on this cost group.

The last three categories represent different types of operating costs. They are (1) fixed operating costs, (2) constant unit operating costs, and (3) variable operating costs. Fixed *operating costs* are those which are independent of the number of units produced. They are a function of the size of plant and length of operating period but can be eliminated if the plant is shut down. *Constant unit operating costs* include all items that vary directly with the number of units produced. The final category, that of *variable operating costs*, includes all other costs that arise only when the plant is operating and that are influenced by the volume of output. These costs, which reflect both the rate and hours of operation, include wages, variable equipment operating expenses, utilities, and repair outlays. Time may be expressed in terms of hours or days per week or weeks per year, depending on the particular process under consideration.

A recent illustration of the Rogers and Bardwell cost classification scheme is provided in table 1. Although the example is drawn from a study of egg processing plant operations, the method for sorting costs in terms of their relation to size of plant and to rate and time of operation is directly applicable to our proposed community service analysis.

TABLE 1.—EFFECT OF PLANT SIZE, RATE OF OPERATION AND LENGTH OF OPERATING WEEK ON EGG PROCESSING COSTS

Item	Rated plant capacity (cases per hour)				
	60	120	180	240	300
Time—37½-h week (thousands):					
Variable operating costs	$40.7	$77.2	$113.7	$150.2	$186.8
Constant unit operating costs	82.2	164.5	246.7	328.9	411.2
Fixed operating costs	18.3	31.0	43.8	56.5	69.2
Fixed overhead costs	16.9	32.2	47.5	62.8	78.1
Total, plant costs per year	158.1	304.9	451.7	598.5	745.3
Total, plant costs per week	3.0	5.9	8.7	11.5	14.3
Time—75-h week:					
Variable operating costs	83.0	157.5	232.0	306.4	380.9
Constant unit operating costs	164.5	328.9	493.4	657.8	882.3
Fixed operating costs	33.0	53.6	74.2	98.4	115.4
Fixed overhead costs	18.4	35.9	53.4	70.9	88.5
Total, plant costs per year	298.8	575.9	852.9	1,130.0	1,407.0
Total, plant costs per week	5.7	11.1	16.4	21.7	27.1
Weekly volume (cases):[1]					
37½-h week	2,025	4,050	6,075	8,100	10,125
75-h week	4,050	8,100	12,150	16,200	20,250
Unit cost (per case):					
37½-h week	$1.502	$1.448	$1.430	$1.421	$1.416
75-h week	1.420	1.367	1.350	1.341	1.336

[1] Assumed to be 90 pct of rated capacity.

Source: Blair et al. (1, pp. 31-34).

The estimation of revenues or benefits accruing to a community service project is closely related to the estimation of costs. As suggested by the cost classification scheme recommended above, alternative output levels have an obvious impact on the cost system. For this reason, it is important to summarize revenues, but gross and net, using a framework that is consistent with the proposed cost summaries. It is immediately clear that a single profit figure or internal rate of return calculation will be quite inadequate to give a community group a feel for the likely performance of a proposed project. By providing a consistent set of cost and revenue estimates under alternative assumptions with respect to size of plant, rate of operation and duration of the activity within a calendar year or other appropriate time frame, the difficulties of visualizing a synthesized scheme may be much reduced.

One significant difference between community services projects and projects launched by an independent firm is that benefits and costs are not always borne by the same party. For example, capital outlays may come from public revenues while benefits accrue only to a particular segment of the community. Further, the public burden of the project may be borne by State taxpayers, by county taxpayers, by local community residents, or shared by two or more of these groups. For this reason, it is important that the summary of benefits and costs associated with community services projects clearly indicate not only the aggregate dollar values, or returns measured by some non-monetary scale, but also appropriate values for individual participant groups in the system. This holds true not only for capital outlays, but for alternative methods of bearing annual operating costs as well.

In a recent analysis of the feasibility of rural rental apartments in the Great Plains, Schmidt, *et al.* (12), provide a very good illustration of the use of cost and revenue budgeting for a community service project. In figure 2, the authors provide a summary statement of estimated annual gross revenue under alternative monthly rental charges and under varying rates of occupancy. In figure 3, they provide annual profit estimates for these same revenue-occupancy combinations. The estimates in figure 3 are based on the assumption that utility expenses are incurred whether the apartments are occupied or not. Had operating costs been separated into those which are incurred regardless of occupancy rate and those which are incurred only when units are occupied it would have modified the findings in figure 3 sufficiently to convert the annual profit estimates for the three highest monthly rental charges at the lowest occupancy level shown from negative to positive values. Explaining how these estimates were derived might be somewhat easier if the values shown in table 2 had been expressed in terms of annual total costs before adjusting to cost per apartment per year.

TABLE 2.—AVERAGE ANNUAL OPERATING COSTS PER APARTMENT, 1974

Operating expense items	Type structure	
	Fourplex	Low rise
Owner's overhead [1]	$29	$29
Insurance	71	102
Real estate tax	126	94
Fees [2]	24	16
Repairs	47	71
Miscellaneous supplies	16	24
Other [3]	150	102
Total, without utilities furnished	463	438
Apartment utilities furnished	399	399
Total, with utilities furnished [4]	862	837

[1] Owner's utility expense for such items as lighting and ground maintenance.
[2] Includes legal and/or accounting fees.
[3] Includes expenditures for such items as wages and income taxes.
[4] Expenses incurred if owner pays for water, gas, electricity, and trash collection.

Source: Schmidt et al., p. 4.

FIGURE 2.—Estimates of Annual Gross Revenue for Selected Rental Enterprise.

Alternative 1

Type structure Fourplex

Number of apartments 8

☐ Utilities not furnished

☐ Utilities furnished

Alternative Monthly Rental Charges

$ 180 $ 200 $ 220 $ 240

Calculation of annual gross revenue:

A. (rental charge $________) X (no. of apts. 8) X 12 =(annual gross revenue)

$ 17,280 $ 19,200 $ 21,120 $ 23,040

B. 1/ (percent occupancy ________) X (annual gross revenue $________) = (adjusted annual gross revenue) 2/

Percent occupancy				
95	$ 16,416	$ 18,240	$ 20,064	$ 21,888
90	$ 15,552	$ 17,280	$ 19,008	$ 20,736
85	$ 14,688	$ 16,320	$ 17,952	$ 19,584
80	$ 13,824	$ 15,360	$ 16,896	$ 18,432
75	$ 12,960	$ 14,400	$ 15,840	$ 17,280
70	$ 12,096	$ 13,440	$ 14,784	$ 16,128

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[1] Perform these calculations by first multiplying each percent occupancy times a selected annual gross revenue corresponding to one level of rental charge and write in each resulting calculation under the appropriate rental charge column. Then repeat the calculations for the remaining monthly rental charges.

[2] Gross revenue resulting from less than 100% occupancy of all apartments for a year, or less than 100% collection of rental charges.

Schmidt *et al.* (*12*, p. 8).

FIGURE 3.—Estimates of Annual Profit for Selected Rental Enterprise.

Alternative 1 Type structure Fourplex /_/ Utilities not furnished /☒/ Utilities furnished

Alternative Monthly Rental Charges

	$ 180	$ 200	$ 220	$ 240

Calculation of annual profit

A. (annual gross revenue 1/ $________) - (total annual cost 2/ $17,329) = (annual profit).

	$ -49	$ 1,871	$ 3,791	$ 5,711

B. (adjusted annual gross revenue 3/ $________) - (total annual cost 2/ $________) = (adjusted annual profit) 4/

Percent occupancy				
95	$ -913	$ 911	$ 2,735	$ 4,559
90	$	$ -49	$ 1,679	$ 3,407
85	$	$	$ 623	$ 2,255
80	$	$	$ -433	$ 1,103
75	$	$	$	$ - 49
70	$	$	$	$

[1] Annual gross revenue computed on Form II.
[2] Total annual cost computed on Form I.
[3] Adjusted annual gross revenue computed on Form II.
[4] Adjusted annual profit reflects effect of less than 100% occupancy or less than 100% rent collection.

Schmidt *et al.* (*12*, p. 9).

SOME PECULARITIES OF COMMUNITY DECISIONMAKING

The general thrust of our remarks to this point has been that the measurement of cost-quality-quantity relationships for community services should be approached in much the same manner as a project is approached by a profit-making firm. However, there are clearly additional complications to be taken into account in presenting the costs and benefits of alternative community services systems that are not encountered in the usual profit-making firm decisionmaking process.

One such consideration is the need to take into account how benefit and cost comparisons may influence the support for a particular community activity. Community services activities may generate interest in additional projects or they may lead to disillusionment and retrenchment. In considering alternative community services development strategies, it would seem appropriate to give some thought to the alternative timing of proposals. A given set of proposals when approached in one sequence may lead to greater community enthusiasm and support, while an alternate sequence may produce a negative reaction in the community.

The possibility that a community may change its collective mind with regard to the mix of community services that it is willing to finance is suggested by some of the work dealing with alternative methods of fluid milk delivery undertaken during the second world war. A survey of consumers in Connecticut, supported by similar findings in the State of New York, indicated that housewives would accept every-other-day delivery of milk only if accompanied by a substantial price reduction. However, surveys of comparable groups conducted sometime after the introduction of every-other-day delivery, by government order, indicated that consumers now were quite satisfied with every-other-day delivery of milk, and, in fact, would prefer that daily delivery not be reinstituted! While this illustration may be a bit farfetched, it does serve to emphasize that experience with a new system may well lead to a change in the perceptions of community members concerning the choices that are open to them.

One of the most sensitive areas in which community decisionmaking must be accomplished is that of the public school system. In the case study which follows, an attempt is made to look at the cost-volume relationships for a particular portion of the school production process, namely, the delivery of physical education facilities and services. It raises the broad question of how public school facilities are viewed by the community. Are such facilities, in fact, the domain of public school administrators or are they more appropriately regarded as a community resource that may well serve a much larger fraction of the community as a whole? We have not analyzed in any great depth the changes in perceptions that may occur under a sharing of indoor gymnasium facilities by both school-age and nonschool-age persons in a community. However, it is implicit that active participation by a larger share of the voters in a community could only have positive effects in terms of a greater willingness to invest public funds in new and improved facilities and in more adequate support for programs that directly benefit the school-age population.

ECONOMIES OF SCALE IN HIGH SCHOOL GYMNASIUMS

An analysis of economies of scale in high school gymnasium facilities is offered here as an example of the use of economic engineering methods in the evaluation of community service alternatives. It will be shown substantial economies exist when cost relations are synthesized for selected school sizes. The possibility of sharing the use of high school gymnasiums by both public education and public recreation bodies is examined in terms of likely effects on school costs. It is suggested that through such shared use, it might be feasible to plan for a somewhat larger number of medium-sized schools than would be the case when a school system bears the full cost of these facilities.

A number of studies of economies of scale in public schools have been reported, including those by Cohn (3), Hansen (6), Osburn (9) and Riew (10). Previous investigations into the scale economies of high schools have treated expenditures per student as a dependent variable rather than directly measuring changes in cost per student per year as the size of school increases. This study concentrates on the initial capital outlays and variable costs of operations for selected sizes of high school.

Economies of scale to be found in cost-volume relationships are determined by the underlying production function. Riew discussed these relationships for high schools in terms of inputs in order to avoid measuring school output. Cohn used achievement tests as a measure in his attempt to accurately represent the production function for a particular school. Both of these authors concentrated on individual schools by using only data from school districts that contained a single high school. The procedure used here differs from the studies mentioned above in that economic engineering techniques are applied to model schools of various sizes but of a similar construction type. The result is to accentuate the cost-volume differences that exist due specifically to variations in size.

Attempts to determine the average cost-volume relationship based on a sample of existing schools confuses utilization of a school of given scale with the cost changes that accompany changes in scale. As a result, such attempts are an accurate representation of neither rate nor scale (2). The procedure used in the present analysis is similar to that employed by architects and engineers to synthesize the cost of structures. Most of the detailed work is technical rather than economic in nature, but these technical relationships must be known before the appropriate cost relationships can be developed.

What has been done here is to concentrate on school auxiliary services, specifically gymnasiums, as possible contributing sources to the overall economies of school construction and operation. Using the economic engineering approach, it is possible to determine whether or not gymnasiums contribute to economies of scale in high school operations. If gymnasiums are a significant contributor to such economies, then the shared use of such facilities would reduce somewhat the incentive to build fewer, large-size consolidated schools for the purposes of capturing the benefits of large scale. The procedure is not restricted to the gymnasium facility but is applicable to each of the auxiliary services mentioned by Riew (10, p. 286). In Riew's words:

> Physical education programs and a library, for instance, require many provisions which a school of any size should not lack. For a satisfactory high school program, various equipment and provisions for science laboratories, language, music, and vocational training are basic and essential. For these items, smaller schools bear larger overhead costs. As general standards of high schools continue to improve with increasing investment in capital items, the issue (capital outlays) will become even more important.

Procedure

To develop model gymnasium sizes and types it was first necessary to collect current information on school enrollments and gymnasium facilities. High schools in the State of North Carolina were separated into standard 3- and 4-year high schools. There were a total of 254 such schools. The data collected consisted of total enrollment, physical education enrollment by grade and sex, number of physical education instructors, and a detailed description of the gymnasium facility by square foot area. Based on this information, the schools were classified according to tenth grade enrollment into eight type and size categories as shown in table 3. The following analysis is based on these eight models.

TABLE 3.—DISTRIBUTED OF SCHOOL SIZES AND TYPES, NORTH CAROLINA 1973–74

School size	Enrollment in 10th grade 1973–74	Number of schools 1973–74	Number of 10th grade students		Capacity of model schools[2]
			Average 1973–74[1]	Model schools	
Senior high schools:					
Small	Less than 300	30	241	200	600
Average	300 to 499	47	404	400	1,200
Large	500 to 699	30	592	600	1,800
Very large	700 or more	12	847	800	[3] 2,200
4-yr high schools:					
Small	Less than 150	35	114	100	400
Average	150 to 249	49	199	200	800
Large	250 to 349	36	288	300	1,200
Very large	350 or more	15	441	400	1,600

[1] Based on average of grade enrollments for 1973–74 school year. Information published by division of management information, department of education, State of North Carolina.

[2] Model school size is determined by multiplying the model grade size by 3 for senior highs and 4 for the standard high schools.

[3] Since no senior high school reported more than 2,200 students that size was selected for the largest senior high model.

Admittedly, designing a series of school gymnasiums is not a very precise procedure. The actual layout and construction of a gymnasium will vary by school district and choice of architect, but much of this variation will have little effect on operating costs. To minimize the effects of style variation, a uniform type of construction was used for each gymnasium, thus accentuating the effects of size.

The capacity of each model gymnasium was determined by applying the Statewide average of physical education participation for senior and standard high schools to the model school size total enrollment. The percentages used were 30 and 41 percent, respectively, and were drawn from the total population of 254 schools.

While space requirements were based on the actual averages, they were adjusted to conform with the recommended specifications of the Division of Physical Education of the North Carolina Department of Public Instruction (4) and those published in the literature (7, 8, 14). The actual design aspects were based on recommendations provided by the Division of School Planning for the State of North Carolina. The advantage of this procedure is that relative square footage areas of these eight model gymnasiums reflect existing schools in the State and at the same time are consistent with facilities that currently are being designed and constructed throughout North Carolina. The resulting layouts were consistent with the recommended specifications of the State of North Carolina and reflect new directions for high school physical education programs.

The assumed floor areas for the eight model gymnasiums are shown in table 4. While the total floor areas of the floor plans studied followed a consistent pattern from small to large schools, the components that make up the facilities did not. There was a wide variation in floor space for specific components, especially when considered in terms of area per student.

Initial Investment

To estimate building construction costs for the model schools, a general guideline of 1976 construction prices was followed. This price guideline was based on a standard uniform construction found in North Carolina rather than a national average. These cost estimates for major components and areas of the model facilities are shown in table 5.

TABLE 4.—ASSUMED SQUARE FOOTAGE FOR MODEL SCHOOL GYMNASIUMS, BY SCHOOL SIZE AND TYPE[1]

Gymnasium area	Senior high school enrollment				4-yr high school enrollment			
	600	1, 200	1, 800	2, 200	400	800	1, 200	1, 600
High ceiling	8, 930	10, 000	11, 000	12, 256	7, 703	9, 415	9, 870	10, 500
Wet area	537	1, 000	1, 000	1, 300	250	500	700	900
Dressing area:								
Dressing room	1, 500	2, 200	3, 000	3, 600	1, 200	1, 800	2, 200	2, 264
First aid	200	200	200	200	200	200	200	200
Team room	400	400	800	800	400	400	800	800
Subtotal	2, 100	2, 800	4, 000	4, 500	1, 800	2, 400	3, 200	3, 264
Offices	200	200	250	300	200	200	200	300
Secondary areas:								
Lobby	1, 192	1, 200	1, 400	2, 646		1, 100	1, 200	1, 300
Storage	200	250	400	550	200	200	300	350
Classrooms	650	650	650	1, 000	[2] 650	650	650	650
Subtotal	[2] 2, 042	2, 109	2, 450	4, 196	850	1, 950	2, 150	2, 300
Activity area		3, 200	4, 560	4, 619		3, 200	3, 200	3, 749
Total	13, 809	19, 300	23, 360	27, 271	10, 803	17, 665	19, 320	20, 713
Area per student	23. 02	16. 12	12. 98	12. 40	27. 00	22. 08	16. 10	12. 94
Area per physical education student	74. 24	52. 02	41. 86	39. 99	65. 87	53. 86	39. 28	31. 57

[1] The model areas shown reflect the requirements of the division of school planning and division of physical education, North Carolina Department of Public Instruction and subjective judgment based on information recorded on school designs provided by North Carolina Education Resources Information Center.

[2] Includes activity area.

TABLE 5.—ESTIMATED COST OF CONSTRUCTION, BY CONTRACT CATEGORY AND TYPE OF SPACE
1976 PRICES

Type of space	Contract category[1] dollars per square foot			
	General construction	Heating and ventilation	Electrical	Plumbing
Gymnasium and activity	16	1.75	1.50	
Shower and dressing	23	2.50	2.75	[2] 5.72
Office and secondary	20	2.50	2.75	[2] 9.25

[1] Based on data provided by J. M. Thompson, General Contractors, Raleigh, N.C.
[2] Based on $500 per fixture and converted to square footage cost.

The method used to estimate construction costs is similar to that used by architects and engineers where costs are synthesized from details of materials and labor requirements. It was advantageous to treat the two school types separately, since they differ both in the number of grades included and in the proportion of the student body enrolled in physical education activities.

The decline in building space per physical education student for both school types reflects the fact that since a minimum amount of floor space is required in any gymnasium, space requirements do not increase at a constant rate as school size increases. This implies that the physical education facility is one source of economies of scale in high school construction.

The suggested minimum equipment list for an accredited high school physical education program was obtained from the Physical Education Division of the North Carolina Department of Public Instruction. Equipment expenditures for each individual gymnasium were developed from a detailed listing for each facility.

The total capital outlays summarized in tables 6 and 7 include both building and equipment. Since school physical education facilities are not used up in a single production period it was necessary to transform these total costs into annual costs, using a depreciation rate based on the expected life of the facility. Other costs that can be present in terms of fixed annual outlays are insurance, taxes, and interest on loans.

TABLE 6.—INITIAL INVESTMENT IN BUILDING AND EQUIPMENT FOR MODEL SENIOR HIGH SCHOOLS

Item	Capacity enrollment			
	600	1,200	1,800	2,200
Building construction:				
General	$248,371	$344,600	$420,260	$495,620
Heating and ventilation	27,825	38,350	46,730	55,521
Electrical	26,811	36,575	44,789	53,901
Plumbing	16,000	27,500	27,500	34,000
Total	319,007	447,025	539,279	639,042
Equipment	29,187	49,405	66,574	74,024
Total investment	348,194	496,430	605,853	713,066
Investment per student:				
Building	531.67	372.52	299.59	290.47
Equipment	48.65	41.17	36.99	33.65
Total	580.32	413.69	336.58	324.12

TABLE 7.—INITIAL INVESTMENT IN BUILDING AND EQUIPMENT FOR MODEL 4-YR HIGH SCHOOLS

Item	Capacity enrollment			
	400	800	1,200	1,600
Building construction:				
General	$191, 398	$311, 540	$315, 820	$375, 756
Heating and ventilation	21, 230	34, 701	38, 497	41, 845
Electrical	20, 078	32, 809	36, 792	39, 974
Plumbing	16, 000	27, 500	27, 500	39, 000
Total	248, 706	406, 550	448, 609	496, 575
Equipment	25, 002	37, 158	48, 097	57, 709
Total investment	273, 708	443, 708	496, 706	554, 284
Investment per student:				
Building	621. 76	508. 18	373. 84	310. 36
Equipment	62. 51	46. 45	40. 08	36. 07
Total	684. 27	554. 63	413. 92	346. 43

Since the comparison here is between two public agencies, school and recreation administration, it is possible to eliminate from consideration taxes on the building. The State of North Carolina finances local school construction on an average daily attendance basis with money generated from State-wide bonds. Thus it was possible also to delete interest paid on the bonds or loans. As this interest rate is the same for all school districts, it was felt that such across-the-board reduction in fixed costs would have little or no effect on the final comparisons. These annual fixed costs are summarized in tables 8 and 9. A straight-line depreciation based on 100 years' life was used because this is the accounting procedure adopted by the controllers office of the North Carolina Department of Public Instruction.

TABLE 8.—ANNUAL COST SUMMARY FOR MODEL SENIOR HIGH SCHOOLS

Item	Capacity enrollment			
	600	1, 200	1, 800	2, 200
Fixed overhead costs:				
Depreciation [1]	$3, 482	$4, 964	$6, 059	$7, 131
Insurance	447	638	799	916
Labor [2]	13, 750	27, 500	41, 251	50, 418
Utilities	9, 691	13, 313	17, 555	20, 347
Total	27, 370	46, 415	65, 644	78, 812
Cost per student:				
Fixed overhead	6. 54	4. 67	38. 80	3. 66
Labor	22. 92	22. 92	22. 92	22. 92
Utilities	16. 15	11. 09	9. 75	9. 24
Total	45. 61	38. 68	36. 47	35. 82

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[1] Straight-line depreciation over 100 yr following practice of Comptrollers Office, North Carolina Department of Public Instruction.

[2] Based on average annual salary of $11,086, 180-day school year, 5 classes of 30 students each with 41-percent enrollment in P.E. courses in 4-yr high schools and 30 percent in senior high schools.

TABLE 9.—ANNUAL COST SUMMARY FOR MODEL 4-YR HIGH SCHOOLS

Item	Capacity enrollment			
	400	800	1,200	1,600
Fixed overhead costs:				
Depreciation [1]	$2,737	$4,437	$4,967	$5,520
Insurance	352	570	638	710
Labor [2]	12,124	24,248	36,372	48,496
Utilities	7,936	12,645	14,969	17,417
Total	23,149	41,900	56,946	72,143
Cost per student:				
Fixed overhead	7.72	6.26	4.67	3.89
Labor	30.31	30.31	30.31	30.31
Utilities	19.84	15.80	12.47	10.89
Total	57.87	52.37	47.45	45.09

[1] Straight-line depreciation over 100 yr following practice of Comptrollers Office, North Carolina Department of Public Instruction.

[2] Based on average annual salary of $11,086, 180-day school year, 5 classes of 30 students each with 41-percent enrollment in P.E. courses in 4-yr high schools and 30 percent in senior high schools.

In terms of initial investment per student for the total student population, the larger schools were found to have an important cost advantage over the smaller schools, assuming that the quality of services offered in all cases is equivalent.

Variable Operating Costs

The variable costs associated with the operation of a high school physical education facility include instructional costs, electrical consumption, water and energy required for heating. Instructional costs were calculated by determining for each school size the number of teachers necessary for the average number of physical education students, assuming each instructor taught five sections of 30 students each per day, and applying this number to the 1975–76 average salary of $11,089 per year.

Labor costs shown in tables 8 and 9 are uniform across sizes of school because the student-teacher ratio is maintained at 30 to 1. If this constant labor cost is eliminated, then for senior high schools, the increase in gymnasium size causes a decrease in the combined cost per student from $22.69 per student to $12.90 per student, representing a savings of some 43 percent. For the standard 4-year high schools, the increase in facility size results in a 46 percent decrease in per-student cost. If labor costs are included, the percentages are 21 and 22, respectively. This is shown graphically in figure 4 where it is apparent there are important cost advantages for large public school gymnasium facilities in both senior and standard 4-year high schools.

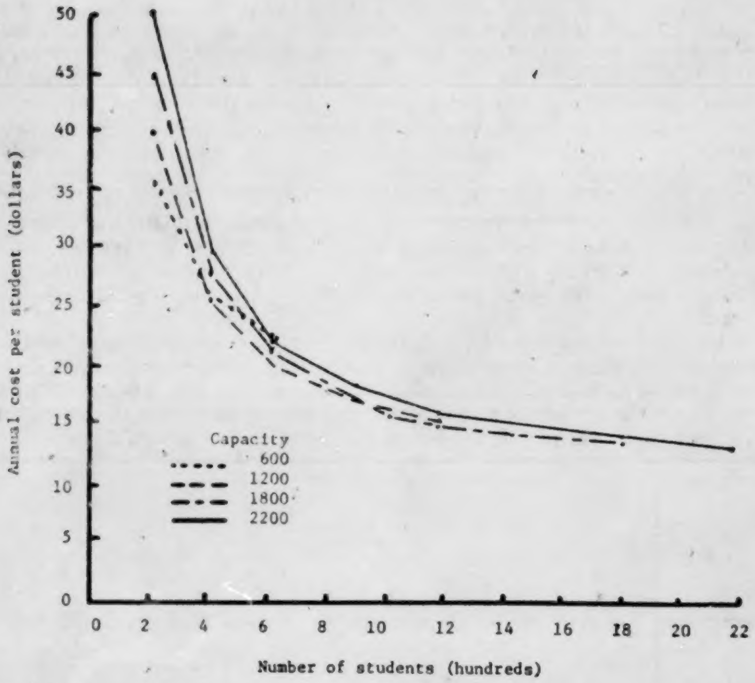

FIGURE 4.—Relationship between average annual cost and number of students enrolled in model senior high schools.

One final word pertaining to labor costs is in order. There was no attempt to include either administrative costs or janitorial services. Administrative costs are a function of total student enrollment and cover the entire school program, not solely the physical education activities. Thus the salaries of physical education instructors were included, but not those of administrative personnel. Janitorial services, while not a direct function of student enrollment, are considered as a part of the total school complex and not the gymnasium *per se*. For this reason the janitorial services were not included. In a technical sense it would have been appropriate to include both on a per student or square foot basis but it was felt that ignoring these costs would not bias the results.

Intensity of Use

The relationships illustrated in figure 4 indicate that for senior highs there is a significant costs advantage in selection of a gymnasium designed for an 1,800 pupil school for any enrollment greater than 900 students. It pays to construct a large gymnasium facility associated with a school of 1,800 total enrollment, and operate it at half capacity rather than to build an average gymnasium associated with a school of 1,200 total enrollment and operate it at 75 percent of capacity for a 900 pupil school. There is little costs advantage to be derived from the construction of a 2,200 pupil school as far as the gymnasium is concerned. In other words, economies in construction of the gymnasium associated with the largest senior high school do not justify the erection of such facilities.

The reason for such conclusions is found to be associated with intensity of use. The average area per physical education student in the model senior highs declines from 74.24 square feet for the small school to 39.99 square feet for the very large school, a reduction of 46 percent. The same relationship exists for the standard 4-year schools.

For the 4-year schools, the results are even more pronounced in that the very large school gymnasium facility is superior on an average cost per student basis for enrollments as small as 400 students (figure 5). The intensity of use also is more pronounced here with the reduction in floor space per physical education student being some 52 percent.

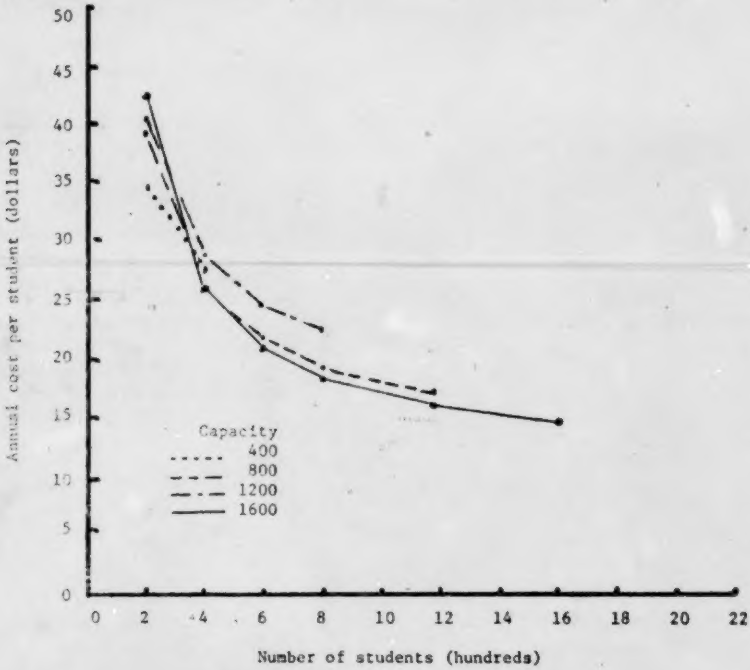

FIGURE 5.—Relationship between average annual cost and number of students enrolled in model 4-year high schools.

Implications for Shared Facility Use

The intention here is not to make a case for a single optimum size school, but rather to show that the physical education facility does contribute to economies of scale for the overall construction. It is possible to take advantage of such economies through the shared use of gymnasium facilities. The elimination of this scource of scale economies can decrease the incentive to construct very large school plants. One means of doing so is to share the initial investment necessary to construct a given school gymnasium between school authorities and any local agency in whose interest it is to provide community recreation.

Figure 6 is a graphic representation of the average cost per student for gymnasium construction for the model school sizes. The ordinate in figure 7 is an index scale which shows that the investment per student for the small 4-year school is twice that of the very large 4-year school and approximately 80 percent greater for small senior highs than for large ones. In figure 6 the point S_1 represents a small senior high gymnasium of 13,809 square feet with an average cost of \$580.32 per student. Point S_4 represents a very large school of the same type with a physical education facility of 27,271 square feet and an average outlay of \$324.12 per student.

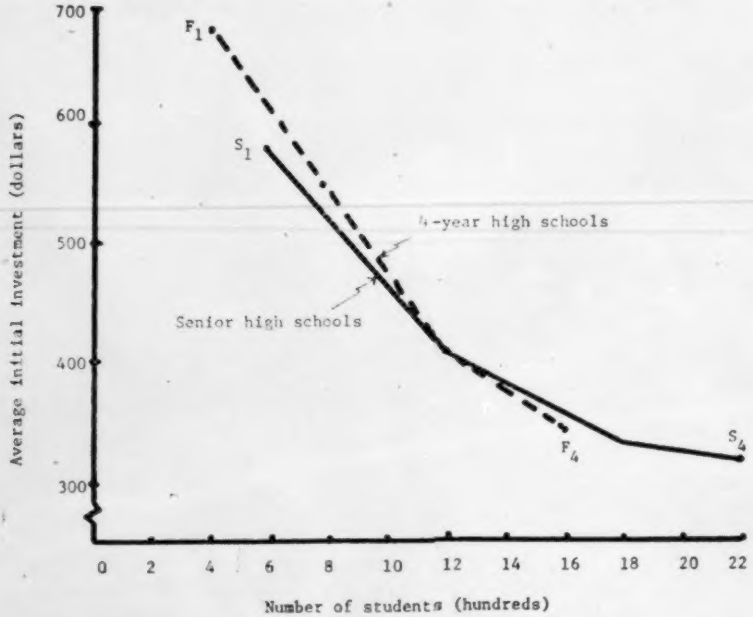

FIGURE 6.—Relationship between average initial investment and capacity enrollment in model high schools.

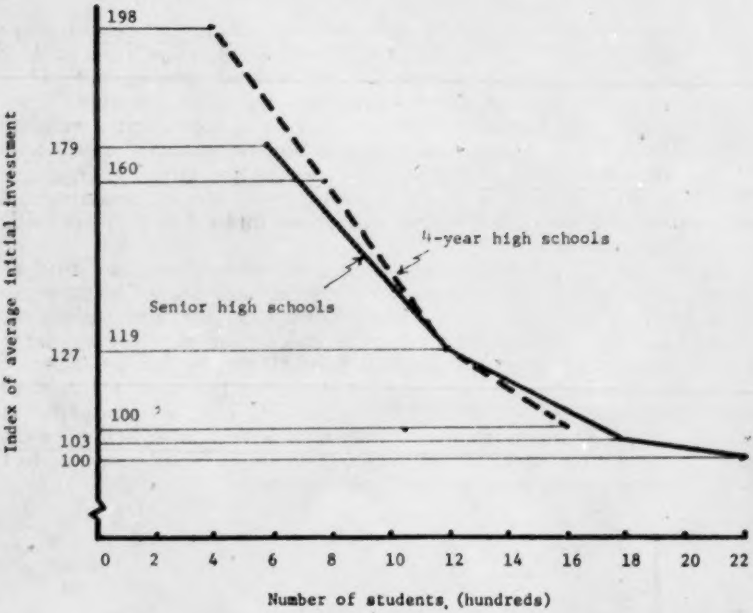

FIGURE 7.—Relationship between index of average initial investment and capacity enrollment in model high schools. (Index=100 for largest school of each type.)

The Parks and Recreation Department, Raleigh, North Carolina, recently (1974) completed a capital improvement program which included two 10,000 square foot recreation centers costing $214,000 each for building and equipment and four 16,000 square foot centers costing $292,000 each. Consider the possible sharing by the Recreation Department in the cost of a single 10,000 square foot high school gymnasium including associated teaching space similar to that designed for a 1200-student senior high school. The estimated total cost for this plant is $496,430 or $414 per student. Suppose the school board allocated $324.12 per student, the lowest possible investment per student found for the very large senior high school, with the Recreation Department providing the balance. The costs would be shared as follows:

Public agency	Capital investment		Savings from shared use
	Independent construction	Shared use	
School board	$496, 430	$388, 944	$107, 486
Recreation department	214, 000	107, 486	106, 514
Total	710, 430	496, 430	214, 000

Program quality considerations must enter any decision for shared use. The high school may become more of a community "place" through shared use, but conflicts over schedules and maintenance effort might well arise. However, it is clear that shared use would gain economies for smaller schools and would stretch limited capital available for school buildings and recreation facilities.

The same general result holds for the 4-year schools, but one must be hesitant about applying these cost figures indiscriminately. The very large senior high gymnasium is designed to seat some 1,400 people. There is no reason to expect that a small school of either type would need to seat such numbers. To the extent that the design for shared facilities would differ from those presented, a direct comparison of this sort is somewhat misleading, but the important conclusion is the potential cost advantage of shared use.

One could argue that what is true for the small schools is true for the larger ones as well, and therefore shared use of the larger school facilities would produce the same general result. This argument is correct. However, in this case, one is speaking of a large facility such as a consolidated school in a sparsely populated area. The question arises as to whether or not people would travel to the school to participate in community recreation programs. The point here turns on the widely discussed topic of the trade-off that exists between the decrease in processing costs per unit as plant size increases and the increased transport costs necessary to assemble the needed inputs.

In an area with a density of 5 high school students per square mile, for example, an area with a radius of 11.8 miles would generate 2,200 students in contrast to only 4.8 miles in an area where the density of high school students is 30.4 per mile, the average for all school districts in the State of North Carolina. The relationship between density and the radii of areas necessary to fill schools of various capacities is shown in figure 8. If a single large school is to be constructed to serve a particular geographic area and provide for shared use, this implies that participants in community indoor recreation would travel a maximum of almost 12 miles in the less dense areas but only slightly more than 2 miles in the most dense areas. This emphasizes the fact that there exists a trade-off between the cost advantage of increased number of schools, made possible through shared facility use, and a demand sufficiently large to justify the improved access to community recreation programs.

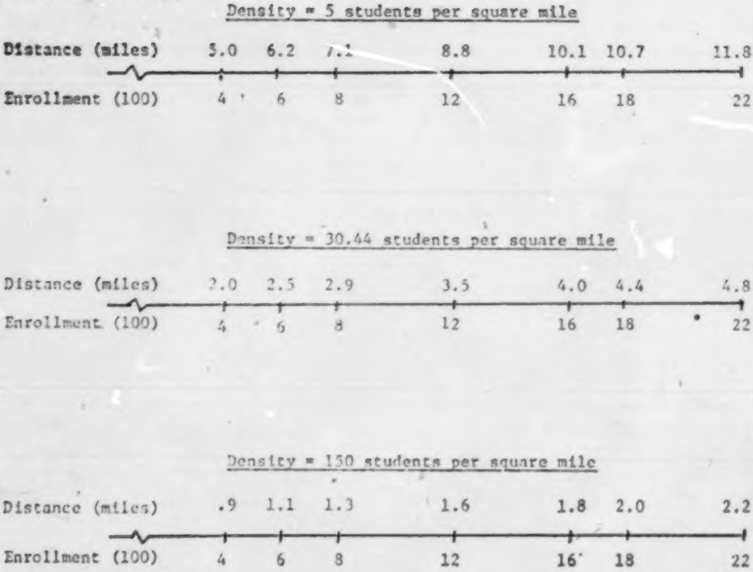
Density = 5 students per square mile
Distance (miles) 5.0 6.2 7.1 8.8 10.1 10.7 11.8
Enrollment (100) 4 6 8 12 16 18 22
Density = 30.44 students per square mile
Distance (miles) 2.0 2.5 2.9 3.5 4.0 4.4 4.8
Enrollment (100) 4 6 8 12 16 18 22
Density = 150 students per square mile
Distance (miles) .9 1.1 1.3 1.6 1.8 2.0 2.2
Enrollment (100) 4 6 8 12 16 18 22

FIGURE 8.—Effect of density of student population and number of students enrolled on radius of circular attendance area.

CONCLUSIONS

It has been shown that school gymnasium facilities are significant contributors to the overall economies of scale in high school construction. The cost savings on a per-student basis amount to 46 and 52 percent for senior and 4-year high schools, respectively. The importance of these savings when compared to other auxiliary facilities such as libraries, auditoriums, vocational education facilities etc. is at present unknown. It will be necessary to apply the same economic engineering techniques to these facilities in order to determine relative contributions of each. Since the gymnasium facility lends itself so readily to shared use with the community at large, it is possible to present a strong case for the shared use of such facilities as a means of reducing the incentive toward consolidation of smaller sized schools.

The need for a rigorous investigation of the demand for public indoor recreation is evident in order to present a more impressive case for shared use. However, Löschian demand analysis insures that an increased number of community school gymnasiums will maximize whatever demand exists in a given market area regardless of the original shape of the total market area.

The shared use of gymnasium facilities is a feasible alternative for funding both a viable physical education program in the public schools and a community recreation program while conserving public monies. With the frequent disapproval of bond issues, perhaps this is an idea whose time has come.

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COMMUNITY SERVICE RESEARCH NEEDS OF LOCAL DECISIONMAKERS

[By Gerald A. Doeksen and Joseph F. Schmidt*]

If a goal of community service research is to provide research results which local decisionmakers can and will use, it is imperative that the researcher work closely with local leaders in solving community service problems. The Economic Research Service (ERS) adopted this procedure for the Great Plains Matrix Research Project. The overall objective of the project was to assist local decisionmakers in the Great Plains in solving problems of rural development as they occur at the local level. Northwestern Oklahoma, which has typical Great Plains economic and social conditions, was selected as the study area. A team of researchers, working closely with extension and sub-state personnel in the study area, identified problems facing local decisionmakers, outlined research projects, conducted the research, and presented the results to local leaders. Assistance continued with the research team, extension, and sub-state personnel working with the leaders throughout the decisionmaking phase and during the implementation phase, thus observing how and what research data were used and how decisions were made.

The majority of the problems which surfaced were community service related. Requests arising from local decisionmakers were primarily two types. The first and most frequent type of request was for budget data which includes costs, returns, and quality of alternative delivery systems for a specific service. For example, local leaders in Alfalfa County, Oklahoma, a community with a little over 2,000 residents, were informed by two funeral home operators that ambulance service would be discontinued in 6 months. The local leaders desired information on alternatives available to them, costs and returns of each alternative, emergency medical technician training, funding sources, and laws pertaining to ambulance operation. The second type of request arising from the local people is that of optimum location. For instance, county commissioners in Major County were debating whether to buy one, two, or three rural fire trucks and where to locate them. For every combination they desired quality and cost information.

The procedure adopted in this paper will be to discuss the two types of problems, using results of research projects which were completed and/or are presently being conducted. Space will not permit us to cover each service in detail, thus we will discuss in detail one project of each type and summarize others.

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*Economist and Agricultural Economist, respectively, Economic Research Service, U.S. Department of Agriculture, Stillwater Okla. Helpful comments of James Nelson, James Plaxico and Luther Tweeten added much to this paper; however, the authors are responsible for any shortcomings.

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Budget Research Needs

To meet local needs, community service researchers need to take a lesson from farm management economists. Years back, they realized the need of the farmer and rancher for up-to-date enterprise budgets. These economists made the enterprise budget the foundation of their research and they expanded to more sophisticated methodologies with the budget as the basic data source. Our experience indicates that the budget is a basic need of local decisionmakers facing community service problems. Once the basic budgets are available, more sophisticated models and analysis can be completed.

A budget is defined as a plan for the future in which all items of costs and returns are estimated. A complete budget makes it possible to estimate net income or loss expected from alternative plans. The main purpose of budgeting is to compare the profitability of different kinds of organizations (1, p. 93). The data must be such that it can be used to evaluate alternative organizations. Because of space limitations, only a rural ambulance problem will be used to illustrate how this was accomplished, while highlights of other community service budget studies will be presented.[1]

Budget Needs—Rural Ambulance Service (5)

Alfalfa County decisionmakers were given 6 months' notice by funeral home operators of their intentions to discontinue ambulance service. A research project was designed to determine the costs and returns of the alternatives confronting the local decisionmakers. The project contained two main parts. The first consisted of estimating returns for a service area, while the second involved estimating costs of operating an ambulance service.

Procedure to Estimate Returns—Data related to ambulance calls were collected from 22 ambulance operators in the study area. From the data, a procedure to estimate ambulance calls and returns for a service area was designed. The procedure entails estimating the number of ambulance calls per year and then estimating yearly returns.

To estimate the number of calls, ambulance calls were classified into three types: (1) highway accident calls, (2) transfer calls, and (3) other medical calls. Highway accident calls included not only automobiles but other vehicles as well and were a function of the number of vehicles which varied very little over time. Thus, an average of the number of ambulance highway calls of the preceding 2 or 3 years was found to be an accurate estimate. Transfer calls were defined as the movement of patients between hospitals and were a function of the size and services of the local hospital, the local medical staff, and other medical factors. Transfers can be estimated from records of the local hospital. Other medical calls included all other calls and are generally for emergency reasons, such as those for heart attack, strokes, etc. These were found to be a function of age. Using eight age categories, utilization rates were derived which indicated the number of calls per 1,000 population. These utilization rates can be used with area population data to predict the number of other medical calls. By summing the estimate of highway accident, transfer, and other medical calls, the total number of ambulance calls for a service area per year can be predicted.[2]

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[1] Budgets can be prepared by surveying existing community service operations or by an engineering approach. For examples of complete or partial budget studies, see (*7*, *8*, and *11*).

In estimating returns, information on percent of users paying ambulance bills, average fee, and mileage information is needed. For the study area, the most frequent charge rate was $25 per call plus $1 per mile one way. Approximately 66 percent of the users paid their bills in the study area. Average mileage information was obtained by ascertaining the size of the service area and the spatial distribution of the population. This data along with number of calls did permit a prediction of yearly returns for a given service area.

A simple form was developed for assisting local decisionmakers in the Great Plains who face this problem. The form requires the local decisionmaker to enter local population data, specify several assumptions, and with this data he can estimate returns for his service area.

Estimating Costs of Providing Ambulance Service—Ambulance service costs, as well as estimated returns, are needed if local decisionmakers are going to determine a method of providing ambulance service within their financial capabilities. Costs were divided into capital and operating.

Capital expenditures: Capital expenditures included the ambulance and communication system. Ambulance dealers were interviewed to determine costs of three types of ambulances which contained basic equipment and basic medical equipment. Communication equipment needs and costs were obtained from electrical engineers and communication equipment dealers.

Operating expenses: Operating items include vehicle, medical, and labor expenses. Information for operating expenses were obtained from ambulance operators in the study area. Vehicle operating expenses such as gasoline usage, tire wear, annual tuneup, etc. were computed from this information. Likewise, medical expenses such as linens, oxygen, etc. were estimated on a per call basis. Labor arrangements, labor costs, training requirements were also obtained from ambulance operators in the study area.

Another simple form was devised to estimate yearly capital and operating costs for a given service area. This form allows the local decisionmaker to estimate yearly capital expenses, based on average annual mileage and operating expenses for the estimated number of ambulance calls and mileage. This form, along with the form for estimating receipts, do not permit an easy evaluation of alternatives, thus a summary form was developed. This third form is presented in table 1 and contains data the research team presented to the local decisionmakers of Alfalfa County.

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[2] In addition, information concerning the probability of two calls occurring at the same time is needed. If the probability is high, provisions will be needed to allow for a backup unit.

TABLE 1.—SUMMARY FORM OF ALTERNATIVES FACING LOCAL DECISIONMAKERS OF ALFALFA COUNTY, OKLA.

[Form III. Procedure used to compare estimated annual receipt and costs for alternative ambulance delivery systems.]

I. Estimated receipt (potential receipts) equals	$19,870
Potential receipts times 60-pct payment rate equals	11,922
Potential receipts times 70-pct payment rate equals	13,909
Potential receipts times 80-pct payment rate equals	15,896
Potential receipts times 90-pct payment rate equals	17,883

	1st alternative	2d alternative	3d alternative	4th alternative
II. Estimated costs: Specify vehicle, communication system and labor system	(1)	(2)	(3)	(4)
A. Capital expenditure:				
Vehicle depreciation	$3,225	$3,225	$3,225	$3,225
Communication depreciation	800	800	800	800
Interest	1,440	1,440	1,440	1,440
Insurance	520	500	500	500
Subtotal	5,965	5,965	5,965	5,965
B. Operating expense:				
Vehicle	1,954	1,954	1,954	1,954
Communication	252	252	252	252
Medical	424	424	424	424
Subtotal	2,630	2,630	2,630	2,630
C. Labor costs: Subtotal	12,418	4,320	3,958	24,837
D. Other expenses: Subtotal	300	800	800	800
Total	21,313	13,715	13,353	34,232

[1] High-top van, new communication, hospital based.

[2] High-top van, new communication, volunteer ($5 per night).

[3] High-top van, new communication, volunteer from 5 p.m. to 8 a.m. (paid $5 per call or 10 cents per mile).

[4] High-top van, new communication, fully staffed system.

Source: (5).

Estimated Receipts and Costs for Ambulance Service Serving Alfalfa County, Oklahoma—In summary, the research project devised three simple forms which were used to analyze the ambulance problem in Alfalfa County. Forms were designed such that local leaders in other Great Plains areas can easily use them. Form I allows local officials to estimate the number of ambulance calls and returns. Form II provides capital and operating estimates, while form III summarizes costs and returns for alternatives considered. Based on form I, Alfalfa County could expect about 335 ambulance calls per year. Further assume an ambulance fee of $25 per call plus $1 per mile one way. In addition, assume an average ambulance run of 15 miles one way. The total potential returns for this service area is $19,870. If 70 percent of the users pay their bills, yearly returns would equal $13,909.

The estimated yearly cost of providing the ambulance service for the assumed service area can be calculated on form II. Assume a new hightop ambulance is purchased and that an old ambulance is available as a backup unit. Once mileage on the new ambulance reaches 75,000, it serves as a backup unit. Further, assume that a community communication system exists; thus communication equipment needs to be purchased for the vehicle only. Estimated yearly costs under various labor schemes are presented in table 1. Capital and operating expenses were estimated based on the estimates that the vehicle would travel 24,000 miles per year. Vehicle and communication system depreciation was estimated at $4,025 per year, while interest and insurance equalled $1,940. Vehicle operating expenses equalled $1,954 and medical expenses $424. Labor costs range from $3,958 for the volunteer system (where volunteers make the calls from 5 p.m. to 8.a m. and are paid $5 per call or 10¢ per mile, whichever is greatest) to $24,837 for a fully-staffed system.

In summary, if 70 percent of the patients pay their bills, the volunteer labor systems would come close to breaking even. The data clearly indicate the economic problems confronting funeral operators who are operating ambulance services and indicates why many are discontinuing ambulance service.

The ambulance problem and our budget approach was covered in detail. Other problems with the same type of information needs, costs, and returns were handled much the same way. Thus, these studies will be discussed only briefly.

Budget Needs—Rural Rental Housing (10)

Shortage of housing, particularly rental units, was a concern of local decisionmakers in the study area. It was felt that increasing the number or rental dwellings would enhance the attractiveness of their community for location of industry as well as improve the quality of housing for current residents. Several community leaders were considering the formation of housing trusts or nonprofit organizations to sponsor construction of new rental units. However, they were in need of construction and operating costs of alternative types of apartment structures as well as guidelines for management practices and measurement of local demand.

Most communities in the study area are small enough to be eligible to apply for financing the apartment construction through the Farmers Home Administration's (FmHA) rural rental housing loan program. Several of these rural rental dwellings already existed in the Great Plains area, and FmHA's cooperation was solicited in an effort to obtain construction and operating costs on existing units. Average construction and operating costs per apartment were computed for both fourplex and low-rise type apartment structures. Excluding land costs, average construction costs per apartment were $12,711 and $11,634 for a fourplex and low-rise apartment, respectively. Average annual operating costs per apartment without utilities furnished were $463 and $438 for a fourplex and low-rise apartment, respectively. Approximately $400 was added to the average annual cost of operation per apartment when utilities were furnished. These average costs are used to estimate annual total cost for financing and operating a rental enterprise of a certain type structure and number of apartments. Annual revenue was estimated simply by selecting several monthly rental rates, multiplying by 12 and then by the number of apartments. Estimation of revenue adjusted by percent of occupancy or percent of rent collected was also recommended. Estimated accounting profits or loss at various rates of occupancy so rent collection for selected monthly rental rates were calculated, using the cost and revenue estimates. Three standardized forms for there estimates are provided to decisionmakers who complete a set for each alternative type structure or number of apartments being considered. Guidelines for a survey to estimate local demand for rental units are also provided.

Decisionmakers interested in this type of venture can use this information to evaluate alternative structures and number of apartments and to estimate costs, receipts and required rental rates for each alternative. Management strategies used by existing rental apartment operators and a summary of the FmHA rural rental housing program are presented in the full report.

Budget Needs—Law Enforcement (9)

Rural residents in the Great Plains are becoming increasingly concerned over low levels of police services available to them. As a result, town officials and county commissioners are experiencing strong pressures to raise the level of police service. Alternative approaches to raising the level of police service include: (1) individual communities establishing or expanding their own department, (2) establishing a police agency shared by at least two closely located communities, or (3) communities contracting for police services. Research information is needed by local decisionmakers to allow evaluation of each alternative approach with respect to costs, level of service, and local needs.

Methodology in this research effort is taking three basic thrusts. First, models are being developed to estimate the number of calls for police service, based upon past frequencies of incidents for communities and open country areas. Separate models are anticipated for communities with less than 2,500 population, 2,500–10,000 population, and open country areas. Second, capital and operating budget forms are being developed to estimate costs under each alternative method of increasing police service. Third, quantity of police service will be measured in terms of man hours of police service available or number of officers per 1,000 population under each alternative.

Decisionmakers should be able to take this information and estimate the number of calls for police service for a given service area and estimate capital and operating costs under alternative methods and levels of service.

Budget Needs—Rural Fire Service (3)

An extremely dry year in many areas of the Great Plains in 1976 caused many local decisionmakers to evaluate and seek to improve their local fire departments. Again, local decisionmakers requested budget data and a research project was conducted.

Fire frequency rates were derived by gathering data from all fire departments in 10 counties in Northwest Oklahoma. Taking these rates, it is possible to estimate the annual number of fire calls for a given service area based on conditions within the service area. Capital items included (1) fire trucks, (2) fire stations, (3) communication systems, and (4) firefighter equipment. Data concerning costs were provided by dealers and contractors. Operating expenses provided by local fire chiefs included such items as communucation repairs, utilities for fire stations, fuel for trucks, and labor costs.

Three forms were developed for local decisionmakers to use to analyze alternative means of providing fire protection for their service area. To demonstrate their use, the Northwestern Oklahoma town of Ames and its surrounding rural area was chosen as an example area. From form I, it was predicted that 19 fires would occur during 1976 in Ames and the rural area it serves. Form II provided an easy method for calculating annual capital costs ($3.126), whereas form III provided a simple method of estimating annual operating costs ($2,376).

A brief summary of the annual capital costs and operating expenses are as follows:

Capital costs:	
a. fire truck	$1, 103. 12
b. communications system	935. 03
c. fire station	932. 45
d. firefighter equipment	155. 41
Subtotal	3, 126. 01
Operating expenses:	
a. vehicle	419. 66
b. equipment	57. 00
c. labor	1, 116. 00
d. fire station	784. 00
Subtotal	2, 376. 66
Total annual costs	5, 502. 67
Costs per fire	290. 00

Local decisionmakers in Ames would have to charge $290 per fire or obtain financial support that would total $5,502 annually if all costs of their fire protection were covered by users.

Since financing is a problem in many towns, several alternative financial arrangements are discussed in the report (3). Training available through State agencies and organizations is also listed. In addition, State and Federal regulations affecting the operation of a fire department are explained.

Budget Needs—Other Services

Several other projects underway resulted from local decisionmakers demands for budget data. These include budgets for an industrial site (1), rural hospitals (35 bed and 70 bed), and several sizes of rural clinics. Again, these will be conducted so that research results will provide estimates of capital and operating costs and expected revenue.

OPTIMUM LOCATION RESEARCH NEEDS

In addition to budget information for a specific community service for a specific location, questions are surfacing from local decisionmakers as to where to locate certain facilities. This problem is extremely important when the local decisionmaker is concerned about emergency services such as ambulance, fire, and law enforcement since human lives and property are involved. Location analysis is also important for other community services to insure the lowest cost operation and easiest access by consumers. The main example used will be an analysis of optimum location of rural fire trucks. Other services will be summarized.

Optimum Location Needs—Rural Fire Truck (6)

County commissioners in Major County, Oklahoma, in seeking to improve rural fire protection wanted to buy new rural fire trucks and locate them in existing volunteer fire departments. The research team was requested to outline alternatives and indicate the costs and quality of each alternative.

A general transportation model was used to minimize a linear objective function with respect to specific linear constraints. There are six possible communities (Orion, Bouse Junction, Cleo Springs, Ringwood, Fairview, and Ames) in which to locate a rural fire truck. It is assumed the same quality of on-site fire service could be provided from each supply point. The county was delineated into 30 demand areas with township lines serving as boundaries. Mileage data were calculated from the centers of the 30 demand areas to the six community locations. Three alternative objective functions were used to evaluate alternative locations. These included:

1. Minimum response time to reach a fire,
2. Minimum total mileage for fighting (a) rural fires only or (b) all county fires (rural and urban), and
3. Maximum protection per dollar's worth of burnable property (a) in rural areas or (b) the complete county.

Using the six possible communities in which to locate a rural fire truck, transportation solutions for optimum locations were derived for each objective function determining the placement of one fire truck, two fire trucks, and as many as three fire trucks in the county. These locations were derived from the complete enumeration of the transportation model objective functions.

The optimum locations given the various objective functions are presented in table 2. For each objective function, and each number of trucks, the first two choices are presented. Two quality of service variables are represented by maximum distance and average distance a truck has to travel to reach a fire. Likewise, annual capital and operating costs are presented for each alternative.

TABLE 2.—OPTIMUM LOCATION, RESPONSE TIME IN MILES AND ANNUAL CAPITAL AND OPERATING COSTS FOR VARIOUS NUMBER OF TRUCKS FOR EACH OBJECTIVE FUNCTION, MAJOR COUNTY, OKLA.

Objective function	Optimum location		Response time (miles)				Costs	
			1st choice		2d choice			
	1st choice	2d choice	Maximum distance	Average distance	Maximum distance	Average distance	1st choice	2d choice
I. Minimize response time to get to:								
(a) All fires for location of:								
1. 1 truck	Fairview	Cleo Springs	34	12.2	37	15.8	$5,075	$5,284
2. 2 trucks	Ringwood, Orion	Fairview, Orion	24	13.6	26	9.9	7,363	7,193
3. 3 trucks	Ringwood, Fairview, Bouse Junction.	Fairview, Ringwood, Orion	20	6.7	24	6.5	9,168	9,159
(b) Rural fires for location of:								
1. 1 truck	Fairview	Cleo Springs	34	17.0	37	19.6	4,161	4,251
2. 2 trucks	Ringwood, Orion	Fairview, Orion	24	11.7	26	13.0	6,267	6,314
3. 3 trucks	Ringwood, Fairview Bouse Junction.	Fairview, Ringwood, Orion	20	9.3	24	9.1	8,301	8,295
II. Minimize total miles:								
(a) To fight all fires for location of:								
1. 1 truck	Fairview	Cleo Springs	34	12.2	37	15.8	5,075	5,284
2. 2 trucks	Ringwood, Orion	Ames, Fairview	34	9.0	34	9.1	7,135	7,149
3. 3 trucks	Ringwood, Orion, Fairview	Ames, Orion, Fairview	24	6.5	20	6.7	9,159	9,168
(b) To fight rural fires for location of:								
1. 1 truck	Fairview	Cleo Springs	34	17.0	37	19.6	4,161	4,251
2. 2 trucks	Ringwood, Orion	Ames, Orion	24	11.7	29	12.7	6,267	6,303
3. 3 trucks	Ringwood, Orion, Fairview	Ames, Orion, Fairview	24	9.1	24	9.1	8,295	8,295
III. Maximum protection:								
(a) Per dollar's worth of burnable total property:								
1. 1 truck	Fairview	Ringwood	34	12.2	54	20.9	5,075	5,466
2. 2 trucks	Fairview, Ringwood	Fairview, Ames	34	9.0	24	9.1	7,135	7,149
3. 3 trucks	Fairview, Ringwood, Orion	Fairview, Ames, Ringwood	24	6.5	24	7.8	9,159	9,214
(b) Per dollar's worth of burnable rural property:								
1. 1 truck	Ames	Ringwood	56	24.8	54	22.9	4,415	4,362
2. 2 trucks	Ringwood, Orion	Fairview, Ringwood	24	11.7	34	13.0	6,267	6,210
3. 3 trucks	Fairview, Ringwood, Orion	Fairview, Orion, Ames	24	9.1	20	9.1	8,295	8,295

Source: (6).

Objective I—Minimize Response Time—This objective required selection of location(s) to minimize the maximum distance a fire truck would have to travel to reach a fire. The first choice location for a truck given this objective is in Fairview. The Fairview location is first choice because the furthest a truck at that location would have to travel would be 34 miles, whereas the second choice location of Cleo Springs results in a maximum distance of 37 miles.

Distance figures are used to reflect quality of service at each location. The annual capital and operating costs for the truck at Fairview used to fight all fires is $5,075, and $4,161 if the truck is used for rural fires only. The second best location if the objective is ~~to~~ minimize response time to reach a fire is at Cleo Springs. Annual cost of operating a fire truck at Cleo Springs is $5,284—$209 higher than at Fairview. The additional costs are due to greater annual mileage of a truck located at Cleo Springs versus Fairview.

If the objective includes the location of two fire trucks for fighting all fires and to minimize response time, the best locations are at Ringwood and Orion. The maximum mileage with these locations is 24 miles and average mileage is 13.6 miles—10 miles less than if only one truck was operated. The average distance is larger if two trucks are used for all fires versus one truck, due to the expected higher frequency of fires in Fairview. Annual costs increase from $5,075 for one truck to $7,363 for two trucks, due to the increased capital costs of purchasing the second truck. The question then is whether the reduction in maximum mileage (increase in quality of service) is worth the added cost.

If three trucks are to be purchased to fight all fires, optimum locations are Ringwood, Fairview, and Bouse Junction. The maximum distance for a truck to travel decreases to 20 miles and the annual costs increase to $9,168. Average mileage is 6.7 assuming only one truck at a time attends all fires, and if the trucks attend only rural fires, the average mileage is 9.3.

Objective II—Minimize Total Miles—This objective minimizes total miles fire trucks are expected to travel. In essence, weight is given to each demand area relative to the expected number of fires and distance from each truck location. For one truck fighting all fires or rural fires only, the first choice location is Fairview, second choice location is Cleo Springs. For two trucks fighting all fires, the best locations are Ringwood and Orion. Comparing the results with objective I, the maximum distance a truck would have to travel is either the same or greater, whereas the average distance is either the same or smaller. This occurs because the objective function picks locations to minimize total mileage, thus giving greater attention to demand areas with higher frequency of fires. Likewise, the costs are the same or smaller due to decreased annual mileage under this objective versus objective I.

Objective III—Maximum Protection per Dollar's Worth of Property—This objective considers the value of burnable property in each demand area and locates trucks for maximum protection. This objective function locates fire fighting facilities near high value property. The objective function allows decisionmakers to put high values on structures to which they desire to give special attention, such as schools, hospitals, and nursing homes. Under this objective function, if one truck were to be located to fight all fires, the first choice location would be Fairview and second choice would be Ringwood. If used for rural fires only, the first choice is Ames and second choice is Ringwood. For two trucks fighting only rural fires, first choice locations under this objective function are Ringwood and Orion, whereas the first choice locations for three trucks are Fairview, Ringwood and Orion. Response time and costs under this objective function are generally larger than those under the other two objective functions.

Optimum Location—Other Problems

Optimum location analyses may be useful to local officials for providing solutions to many different problems. One problem which local officials face may be the creation of a county-wide ambulance service. In this case, they will be in need of answers to such questions as where should these ambulances be located and what are the costs and quality estimates of ambulance services at each of these locations? A second example of problems which may confront local officials is rural law enforcement patrolling. Here again, a general transportation model can be used to derive optimum patrolling patterns. These optimum patrolling patterns differ, depending upon the objectives used, such as frequency of checking on certain locations, minimum patrolling mileage, or maximum protection of property values. A third example may be concerned with a regional health planning agency, interested in determining where health care services should be added or expanded. Other community service problems lend themselves to this kind of analysis which can be a valuable aid to local decisionmakers.

SUMMARY

If community service researchers are going to maintain and improve on the relevancy of our research, we must interact with the local decisionmakers, policymakers, and providers of services. The experiences of the Great Plains Project Team has been that budget and location data are two types of information which local decisionmakers are seeking and using. It appears that many academic researchers do not find this type of research attractive because (1) sophisticated models are not employed, (2) it is somewhat risky, and (3) it does not lend results acceptable to many of our scholarly journals.

At this phase in community research for rural areas, sophisticated model results are not needed as much by local decisionmakers as simple budget and location studies. The research is risky because the local decisionmakers immediately use these studies to make their community service decisions. The third reason this type of research is often overlooked is because it does not lend itself to many of our scholarly journals. Sam M. Cordes (4) in reviewing rural health research, summarizes this as follows:

> Of all the empirical pieces of work I reviewed, I would speculate that one of the most useful to local policymakers is the study of rural ambulance services by Doeksen. I would also speculate that because of the straight-forward analytical tools employed the probability of this study being published in a "scholarly" journal is somewhere between slim and none.

In conclusion, our contention is that as community service researchers, we often shy away from the simple projects which yield results most needed by local decisionmakers, and undertake research projects more acceptable to our scholarly journals. This doesn't mean that we are against research using more sophisticated techniques, but feel that the needs of local decisionmakers for applied studies has been overlooked too long by researchers.

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MULTIPLE GOAL DECISIONMAKING APPLIED TO WASTE DISPOSAL ALTERNATIVES

[By Cleve E. Willis[*]]

> In the Affair of so much Importance to you, wherein you ask my Advice, I cannot for want of sufficient Premises, advise you *what* to determine, but if you please I will tell you *how*. When these difficult Cases occur, they are difficult chiefly because while we have them under Consideration all the Reasons *pro* and *con* are not present to the Mind at the same time; but sometimes one Set present themselves, and at other times another, the first being out of Sight. Hence the various Purposes or Inclinations that alternately prevail, and the Uncertainty that perplexes us. To get over this, my Way is, to divide half a Sheet of Paper by a Line into two Columns, writing over the one *pro*, and over the other *con*. Then during three or four Days Consideration I put down under the different Heads short Hints of the different Motives that at different Times occur to me for or against the Measure. When I have thus got them all together in one View, I endeavor to estimate their respective Weights; and where I find two, one on each side, that seem equal, I strike them both out: If I find a Reason *pro* equal to some two Reasons *con*, I strike out the three. If I judge some two Reasons *con* equal to some three Reasons *pro*, I strike out the five; and thus proceeding I find at length where the Ballance lies; and if after a Day or two of farther Consideration nothing new that is of Importance occurs on either side, I come to a Determination accordingly. And tho' the Weight of Reasons cannot be taken with the Precision of Algebraic Quantities, yet when each is thus considered separately and comparatively, and the whole lies before me, I think I can judge better, and am less likely to take a rash Step; and in fact I have found great Advantage from this Kind of Equation, in what may be called "Moral" or "Prudential Algebra."

The introductory quote is from Benjamin Franklin's September 19, 1772, correspondence with Joseph Priestly (9, pp. 26–27), in which he highlighted the importance and complexity of decisions where multiple criteria are pertinent. It seems remarkable how little has been done since then to aid multiple criteria decisionmaking.

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To be sure, the presence of competing goals has been given "lip service" from time to time in the economic literature. But seldom have these adventures been made in a really substantive way. The Lancasterian (10) approach to consumer theory is a notable exception. What should become increasingly clear is that there are few problems of real importance which can be approached by current single-objective methods in operations research without significant chance of serious distortion. Rather than shedding more light on complex (multiple objective) problems, the burgeoning mathematical complexity of contemporary algorithms oftentimes merely reinforces naive interpretations of their solution. The analogy drawn by Cochrane and Zeleny (1, p. xii) is "New holes are not dug by digging old ones deeper".

Economic theory is generally based on the maximization of something, like "utility" or "profit". That is, it is couched in terms of a single objective, where utility (or profit) is really a surrogate for a number of rather complex noncommensurable attributes. Such a compression of such entities is generally accompanied by distortion and a loss of information content. It is this shortcoming to which Oscar Morgenstern (12) refers:

> Economic theory simply is not, in general, confronted with pure maximum problems, certainly not when the theory deals with the interaction of the individual agents not under centralized control. However, this is how economic theory is set up . . . But it is necessary to face up to the empirically given problem.

The "empirically given problem" is inherently one of a vector of objectives, so that the familiar concept of mathematical optimization is not sufficient. Instead, the concepts of "bliss point" or "optimum optimorum" need to be replaced by fuzzy solution concepts including "compromise" and "dominance (partial ordering on the basis of Paretian criteria)."

Adding force to this notion, one would think that economists and other researchers would be of greater service to policymakers if they would permit these decisionmakers to make decisions. Rather than to take the alternatives to the computer and return with the "optimum decision" (when in fact none unambiguously exists) to present to the individual(s) being paid to make choices, it would seem far more appropriate to return with an array of "efficient" solutions in decision and objective space, with some notion of trade-offs among the goals implied by these decisions, and perhaps to assist the decision process of the policymaker by leading him through a sequence of choices in which he discovers something about his valuation of the various trade-offs.

In light of the obvious relevance of multiple goals at the public policy level, it is remarkable that it has taken theories and methods of Multiple Criterion Decision Making so long to become established and that this branch of methodology has yet to become applied in any significant degree. Jacob Marschak (11, p. 8) wonders whether it was possible to confirm " . . . the story of Jawahar lal Nehru's visiting sick Ragnar Frisch in a New Delhi hotel room: Frisch at once set upon Nehru to search for his government's preferences between given criterion-pairs 'inflation rate, unemployment rate.'

Gradually the prime minister began to understand the question and to realize that it had always been his duty to do this soul-searching". One wonders how often policy decisions are made without as much careful consideration even as Franklin's Pro's and Con's.

With this rather lengthy introduction, and with due apologies for the namedropping, the objectives of this paper can now be stated: to argue the importance of multiple goal decisionmaking (done in part above), to develop some concepts in the currently developing field of multiple criteria decisionmaking and to focus on one rather promising approach for a variety of public policy-type decisions of the "vector optimization" kind (developed in the second section), and to illustrate by discussing some results of an analysis of this sort recently performed for a set of sludge disposal (use) alternatives in Massachusetts.

MULTIPLE CRITERIA DECISIONMAKING

"Vector optimization", or mathematical programming with more than a single goal, was pioneered as early as 1951 by Kuhn and Tucker (8). It remained relatively undeveloped until the 1960's, however, when the expression "trade-off" became a part of the language of planners and managers of all sorts. In the past decade, the existing techniques have increased to at least 20 different procedures for solving such problems.

The term "vector optimization" refers to the problem:

(1) $\text{Max } Z(x) = [Z_1(x), Z_2(x), \ldots, Z_p(x)]$

(2) $g_i(x) \leq 0 \qquad i = 1, \ldots, m$

(3) $x_j \geq 0 \qquad j = 1, \ldots, n$

where:

$Z(x)$ is the p-dimensional criterion function (there are p goals or objectives),

x is an n-dimensional vector of decision variables, and

$g_i(x)$ denote the constraints associated with the problem.

The region defined by equations (2) and (3) in E^n, i.e., $X = [x | g_i(x) \leq 0, \forall_i \text{ and } x_j \geq 0, \forall_j]$, is referred to as the feasible region in decision space. Each solution to the problem implies a value for each objective (i.e., $Z_k(x)$, $K = 1, \ldots, p$). The p-dimensional objective function maps the feasible region in E^n (decision space) into the feasible region in objective space (EP).

The expression "vector optimization" is a contradiction, however, since without information about preferences which provide a means for combining incommensurable objectives, and therefore since all feasible solutions are not ordered, an optimal solution cannot be found to the problem. This complete ordering can be obtained only by introducing value judgments into the solution process.

Even with no knowledge of preferences, however, some of the feasible solutions to the vector optimization problem can be eliminated from consideration by the incomplete ordering associated with the p-dimensional objective function. If for each objective more is preferred to less, then only non-inferior or Pareto Optimum solutions are of interest. The purpose of the type of multiple objective decision framework to be discussed here is precisely to identify the set of non-inferior solutions, and having done this, to assist decisionmakers in utilizing this partial ordering information as effectively as possible in arriving at a "best compromise solution."

We begin by assuming no prior articulation of preferences by the decisionmaker and seek to map out the partial ordering of non-inferior solutions where no objective can be improved without adversely affecting at least one other. A technique for doing this can be illustrated by transforming the general problem in (1) through (3) into:

(4) Max $S_k(x)$

subject to

(5) $x \epsilon X$

(6) $S_q(x) \leq U_q, \forall_q \neq k$

(7) $x_j \geq 0, j=1, \ldots, 17$

where, $S_k(x)$ is a single objective function, x is an n-dimensional vector of decision variables, relation (5) represents physical, institutional, and other constraints, $S_q(x)$ designates the $p-1$ other objectives as constraints, and U_q denotes the upper bounds on these goals.

The method begins by incrementally increasing one of the U_q (let us call it $U_{q'}$) contained in (6) until an unfeasible solution results, while holding all other U_q fixed. At each level of $U_{q'}$, primal solution values for x result. These x quantities are substituted into the $S_q(x)$ and maximized $S_k(x)$ to obtain objective function values. Parametric variation of the right-hand side yields points in the non-inferior set where each level of the objectives represents a non-inferior solution in functional space. Another U_q (let us call it $U_{q''}$) is increased parametrically until an infeasible solution results, assuming all other U_q fixed. Again, the corresponding x primal values are substituted into the objectives acting as constraints and a maximized function to determine points in the non-inferior set. This procedure is repeated for all U_q bounds until an infeasible solution is generated. The procedure can then be repeated where the k^{th} objective from (4) is introduced into the constraint set (6) and the $q \neq k$ objectives are introduced into (4) seriatim.

For each problem (that is, for each designation of a "primary" objective k and each increased level of U_q) there is a dual variable or shadow price λ_{kq} associated with the constraint on the q^{th} objective. This dual variable represents the explicit trade-off between the objective function $S_k(x)$ and the constrained objective $S_q(x)$. Of course, when no trade-off exists, λ_{kq} will take on a value of zero and the solution is inferior. The information contained in this set of solutions (decision space, objective space, and shadow prices) forms the basis upon which the decisionmaker can begin the selection process.

Of a host of vector optimization methods—recently, surveyed and compared by (2)—the "surrogate worth trade-off" method was selected for use here on the basis of the quantity of information it supplies as well as computational efficiency. This relatively new method asserts that the decisionmaking process is facilitated by an assessment of the trade-off values of marginal gains and losses among any two objectives relative to the level of attainment for all the objectives. The method was introduced in 1974 by (4) and later developed by (5). The reader is referred to these sources for a detailed treatment of the method. For the present, we merely note that the surrogate worth trade-off method provides a means of assisting the decisionmaker to find a "preferred" non-inferior solution, essentially by determining the tangency between the locus of points of the transformation curve contained in objective space and his perception of the social indifference curve (representing societal utility levels). For simplicity, for example, this can be accomplished by evaluating each non-inferior solution (containing objective and decision space solutions) according to the following criteria:

1. $0 < W \leq 10$, when λ_{kq} marginal units of $S_k(x)$ are preferred over one marginal unit of $S_q(x)$, given fixed levels of all objectives,
2. $W = 0$, when λ_{kq} marginal units of $S_k(x)$ are equivalent to one extra unit of $S_q(x)$, given fixed levels of all objectives,
3. $-10 \leq W < 0$, when λ_{kq} marginal units of $S_k(x)$ are not preferred to one extra unit of $S_q(x)$, given fixed levels of all objectives.

Each non-inferior solution is assigned an ordinal W value with $W=0$ representing the "preferred" solution.

EMPIRICAL ILLUSTRATION

Decisions are currently being made on the method of disposal of Boston's sewage sludge. Ocean disposal is the present mode, and incineration and land application (in the hinterlands for agricultural purposes) are the alternatives receiving the greatest attention in the current decision process. The preliminary studies and reports pertaining to the Boston situation—primarily (3) and (6)—emphasize cost and environmental aspects associated with various disposal systems, and ultimately support the incineration alternative.

Some rather obvious shortcomings of these studies, however, have been suggested by a New England Consortium on Environmental Protection (13). Among these, three seem particularly crucial. First, these alternatives were treated in pretty much an "all-or-none" context, rather than permitting the possibility of a "hybrid" mix of several. Second, criticisms about the quantification of indices of likely environmental effects were advanced. An extension of these charges might be that regardless of how the indices were constructed, no attempt was apparently made to formally include monetary cost and environment in the same decision analysis. Third, the Consortium was disappointed that degrees of uncertainty were not formally recognized in the choice process and that value of the uncertainty-reducing information to result from adoption was not considered (indeed, the wealth of experience with various forms of R and D strategies appear to have been ignored). Again, an extension of their arguments might be that uncertainty was not formally and explicitly considered alongside environmental and dollar costs in making recommendations on the alternative disposal modes.

In light of these shortcomings a choice framework along the lines of the methodology of the previous section was specified and applied to this situation, where the activities included tons of sludge to be disposed by ocean, incineration, and agricultural application, and the objectives were dollar costs, expected environmental consequences, and uncertainty with respect to these environmental costs. The models and results are set out in (14) and (15). The more interested reader may refer to these sources for detail. For present purposes, we merely provide a brief sketch of the model and of the results to illustrate the multiple criteria decisionmaking process and to set up a discussion of the value of the approach.

Econometric methods were applied to data supplied in the two sources mentioned above, to estimate the three criterion functions. The cost objective was exponential in terms of the decision variables, while the other two objective functions were rather satisfactorily estimated as linear functions. If cost is the k^{th} objective in (4), then, we are faced with a non-linear programming problem from the objective standpoint; otherwise, from the constraint (6) standpoint. An obvious constraint of type (5) is that all sludge be disposed (used). In this case, the sum of the decision variables was constrained to equal the 96,000 dry tons available per year. Clearly, for this framework, hybrid activities are admissible, and the multiple goals could be (and were) treated explicitly by surrogate worth trade-off methods. Finally, an additional note is worth making in this latter context, *viz.*, that in the treatment of uncertainty, a decisionmaker may prefer more to less *or* less to more. The former would reflect his valuation of the benefits from reducing the uncertainty by adopting the method and "learning"; the latter would represent a dominant aversion to risk.

The method described earlier was used to identify three dozen non-inferior solutions; that is, levels of disposal by the various methods, levels of the three associated objectives, and shadow prices. None of these was an "all-or-none" solution as the consulting firms were suggesting. Some contained positive values for all three modes, and some for only two. Land application was always in the non-inferior solution set. For these three dozen solutions, cost ranged from $3 billion to $4 billion, expected environmental impacts of the worst system in this regard were roughly double the best, and the degree of risk under the least certain system was just under double that of the most developed system.

This non-inferior solution information, along with shadow prices, was then shown to five individuals acting as decisionmakers, and the surrogate worth tradeoff procedure was followed. For two of these individuals the problem was simplified by the fact that none of the shadow prices, λ_{12} (cost reductions), were sufficient in their minds to compensate for a small unit relaxation of the environmental constraint.

Generally, when W_{12} (S_2^*, S_3^*) and W_{13} (S_2^*, S_3^*), where the subscripts refer respectively to cost, environment, and uncertainty, are both zero at S_2^*, S_3^* then a preferred solution is obtained. However, in practice this will usually not occur and the use of regression analysis will have to be employed. For W_{12} and W_{13}, for each of the three decisionmakers who indicated that some shadow prices were large enough to indicate a change, an indifference band was established and a linear regression was employed to determine the preferred, or best compromise, solutions within the regression band. The results for all three decisionmakers revealed preferred solutions with no ocean disposal, with land application of a somewhat larger portion of the total quantity of sludge than incineration.

At this point, it is reasonable to question the value of the exercise Marschak (11, p. 3) argues that in some instances, "too much rationality is irrational." In this context, what it suggests is that in some cases multiple criteria decisionmaking procedures may be unwarranted in terms of computational expense and time relative to the incremental gain in the value of the decision.

The literature in decision theory of (16), (17), and others would suggest that even in the case of a vector of goals, a form of preposterior analysis would be useful in this regard. The approach has not been pursued in the present illustrative situation, primarily since it is only an illustrative case (the data are preliminary and inadequate at this point to suggest the results should be considered seriously by policymakers). The essence of the approach, however, would involve additional questions to ascertain the extent of the bribe it would take to induce a decisionmaker to give up what he regards as the "most preferred" solution and accept one of the "corners" which would be suggested by the type of analysis, which has been done, of a nonmultiple criteria decisionmaking type. If this value exceeds the relevant costs of multiple criteria decisionmaking, the approach is "rational," and if not, "irrational." In the preposterior case, of course, we are dealing in probabilities rather than known events. Other experiences in multiple criteria decisionmaking should be useful in providing some *history* upon which to base these probabilities.

CONCLUSIONS

With very few exceptions, economists and economic analysis have lagged behind in empirical decision analysis where more than a single goal (treated other than in lexicographic fashion) is involved. Most of the recent work in economics has been in the form of optimum control or, quite recently, adaptive dual control, where strong assumptions are made regarding the actual preference function of the decisionmaker (*e.g.*, a known and quadratic utility function). These researchers have appeared to "skip over" the "here and now" methods of multiple criteria decisionmaking in favor of chasing (and occasionally leading) the electrical engineers in the development of optimum control techniques. Few applications of these techniques have emerged to date. While the applications will undoubtedly emerge shortly; and, as undoubtedly, many will be highly useful in certain areas, it is clear that many other problems are more suitable for solution by other multiple criteria decisionmaking tools.

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